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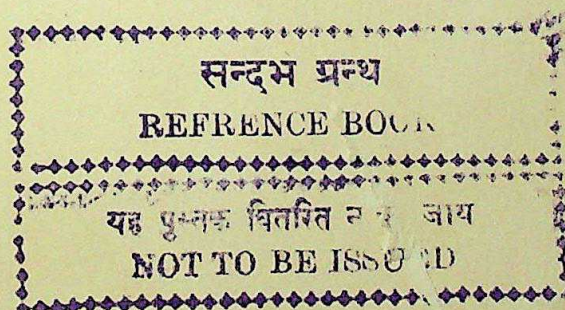
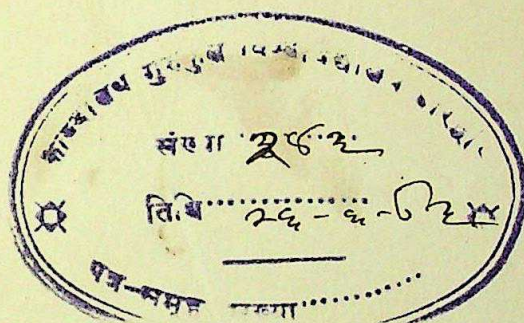
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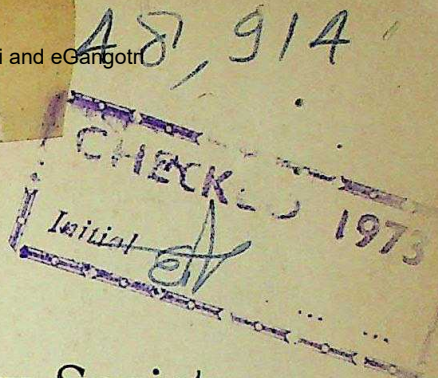
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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. STUART BAKER, F.L.S., F.Z.S., M.B.O.U.

PART XV.

With Plate XVI.

ORDER HEMIPODII.

The *Hemipodii*, or Bustard Quails, are an order of small birds which in general appearance closely resemble true Quails, but, as far as our Indian birds are concerned, can always be identified at a glance by the fact that they have but three toes, the hallux, or hind toe being absent. According to some naturalists two genera are contained in the one family, *i.e.*, *Turnicidae*, the Three-Toed Bustard Quails of the genus *Turnix*, and the Plain Wanderers with four toes, of the genus *Pedionimus*, which are confined to Australia. Other scientists, however, put this latter genus in a separate family, but, as it is not represented in Asia, this point does not interest us.

The nearest relatives of the Bustard Quails are to be found amongst the *Gallinae*, or Game Birds, the *Pterocletes* or Sand Grouse, and the two Families *Rallidae* (Quails), and *Charadriidae* (Plovers), of the order *Grallae*.

The principal anatomical difference between the *Gallinae* and the *Pterocletes* and the present order lies in the formation of the vertebrae. In the two former orders the last cervical and anterior dorsals are all anchylosed in fully adult birds, whereas in the Bustard Quail they are free; in the two former, also, the last dorsal vertebra is united with the lumbar vertebrae to form the sacrum.

In the *Gallinae* the sternum has two notches and the same with *Pterocletes*, though in the latter the second notch may be much reduced; in the *Hemipodii* there is one deep, long notch only, on

each side of the posterior border, and the episternal process is partially perforated to receive the inner ends of the coracoids.

The palate is schizognathous, as in the *Gallinæ*, but the palatines, pterygoids and basipterygoids are more like those of the Plovers.

The nasals are schizorhinal.

The muscles of the thigh are Galline except that the accessory femoro caudal is absent; in our genus *Turnix* the deep plantar tendons unite, as in other birds with but three toes, and then the combined tendons again split up to supply the three toes.

In other respects the Bustard Quail resemble the Game Birds; the young are hatched covered with down, and can run and feed themselves as soon as they leave the nest.

The eggs are practically invariably four in number, and are somewhat conical, being laid in the nest in the same manner, point to point, as the Plovers lay their eggs.

FAMILY TURNICIDÆ.

Genus *Turnix*.

Bill like that of the *Gallinæ*, but rather small and slender. The wings are pointed with the first quill longest. Legs and feet moderate, the latter in some species rather long.

Our Indian species are resident throughout their range, but move higher up the mountains in the warmer months of the year, and may also move about locally in certain parts of India under stress of climatic influences.

Ogilvie-Grant recognizes twenty-one species in the Catalogue of the British Museum, and twenty-two species in his Game Birds, where he adds the species *Turnix whiteheadi* from Luzon. To these twenty-two species Grant further adds two sub-species, and of these twenty-four species and sub-species, five species and one sub-species are, according to him, represented in India.

As regards the sub-species, they are a matter of no little difficulty, but as I shall deal with these under the various species, with which they are connected in detail, further comment is here unnecessary.

The family *Turnicidæ* is composed of birds of which the female is the larger, generally the higher coloured, and always the dominant factor in all domestic matters, for, beyond laying the eggs, she has nothing to do with the rearing of the young.

KEY TO THE SPECIES.

- A. Breast barred right across with black and white or quite black *pugnax*.
- B. Breast never barred or black in the centre.
 - a. Central tail feathers lengthened and pointed and edged with buff; bill dark, not yellow *dussumieri*.

- b. Central tail feathers neither lengthened
nor pointed and with no buff margin;
bill yellow *tanki*.

The different species of the *Hemipodii* have been divided into species, sub-species, or races, by the majority of naturalists since the time of Jerdon, who himself recognized three species of the Common Bustard Quail, viz., *Turnix taijoor* from the plains of India, *Turnix ocellatus* from the Hills of Northern India, and *Turnix pugnax* from Java. The latest authority, Ogilvie-Grant, divides the species *taijoor* into two, *taijoor* and *pugnax*, whilst Sharpe in the Hand-List, and Oates in his Game Birds combine them all under the one name *pugnax*.

Mr. Ogilvie-Grant has dealt very exhaustively with the genus *Turnix* in the Ibis for 1889, and he there writes:

"I am convinced that there is only one species (*T. taijoor*) which ranges through India, Burmah, Malay, Siam and China to Formosa and the Loochoo Islands, and that the key to the constant variety in the tone of the plumage is to be found in the effect of the amount of the annual rainfall in the country which the birds inhabit. By going through the whole of our huge series, I find this theory exactly borne out; for where rain is abundant the prevailing colour of the upper parts is dark brown, where it is moderate the tone is more rufous, and where it is small the birds are very bright rufous."

With this conclusion, i.e., that variation in plumage coincides with variation in rainfall, we shall all agree; the only question to be decided is whether these variations of rainfall together with other possible geographical factors cause definite local variations in plumage sufficiently constant to enable one to form sub-species. I certainly agree with Ogilvie-Grant that all the Indian Bustard Quails, together with the others he mentions, do come under one species, but it seems to me they can be divided into a certain number of sub-species, capable of differentiation by plumage as well as geographically.

It is now generally accepted that the use of the trinomial system is imperative, and that geographical races, where they can be well defined, must be described as sub-species. If we also accept this as being the proper course to follow, we find that the Bustard Quail is a species essentially divisible into certain well-marked races, the difference between which consists, principally in the amount of rufous and depth of colouring on the upper parts, and, to a rather less extent, in size.

The British Museum has a magnificent series of specimens of the species *Turnix pugnax*, and I have also had the advantage of examining those in the Calcutta Museum, in addition to a very great number which have passed through my hands from collectors

in various parts in India. A careful study of this material has led me to the conclusion that there are four well-marked sub-species of Bustard Quail of the species originally described as *pugnax* by Temminck from Java, a bird which cannot be distinguished from that found in Ceylon.

Beginning at the extreme east of the range of this species, we get a bird whose whole upper surface is very richly marked with large bold bars of black with a considerable amount of deep rufous colouration in between the bars. It must be remarked also that this rufous is not the same tint as that of the birds of Southern and Western India, but is deeper and redder, thus giving a very handsome appearance to the upper plumage.

As regards size, the bird of this form is about the same as that from Malay and Burmah, the females have a wing averaging about 3.45" (=87.6mm.) and the males about 3.10" (=78.6mm.). The largest female has a wing of 3.56" (=91.2mm.) and the smallest one of 3.32" (=84.4mm.).

This race extends from Formosa, through Southern and Western China by the Hill Ranges into the Shan States, and also into the Chin Hills further South, whence there are several typical birds of this race in the British Museum from Karen Nee.

This race should bear the name *Turnix pugnax atrocularis*, Eyton (1839).

Leaving the extreme East of the range, we find another race much the same in size, and quite as dark in general colouration; but almost entirely wanting the rich rufous on the upper parts, and also less boldly and richly marked with black.

The dimensions of this sub-species are as follows: the smallest birds being found in Southern Burmah, and the largest in Sikkim and Nepal. In the Federated Malay States a huge series of birds show an average wing measurement for females of 3.50" (=89.7mm.) and for the males of 3.13" (=79.5mm.); from Burmah they average respectively 3.40" (=86.4mm.) and 3.09" (=78.5mm.), and from North-East India they rise again to 3.51" (=89.9mm.) and 3.24" (=82.3mm.), the average of the females being reduced by two or three small immature birds.

This sub-species is found throughout the Federated Malay States and Siam, the Plains of Burmah and Northwards from Arakan through Chittagong and the Chittagong Hill Tracts, Comilla, Assam, Cooch Behar, the Dooars of North-East Bengal and thence into Sikkim and the Hills of Nepal. Southwards it is found throughout the Surma Valley, Mymensingh, Dinajpore, Jalpaiguri, the Darjeeling District and all along the Sub-Himalayan Terai as far West as Bettiah. In the extreme West of its range in Nepal the birds have a certain amount of rufous on their upper plumage, as would be expected, from the comparatively dryness of

its habitat; in the same way birds from Pegu and certain of the drier portions of Southern Burmah also somewhat approach the South Indian form, but are still, on the whole, nearer to the typical Burmese form than to the South Indian one.

This race, or sub-species, should be known as *Turnix pugnax plumbipes* (Hodgson, 1837).

Directly we get South of the districts named as being the habitat of *Turnix p. plumbipes* we come to yet a third sub-species, a decidedly smaller and very much paler race, typically of a very bright rufous above, but running from this colour to a pale, almost isabelline grey in birds from the extreme North-East of its habitat. As a rule in this race the under parts are at least as strongly marked as in *plumbipes*, but, in addition to being paler and more rufous on the upper parts, the pale borders to the scapulars and wing coverts, generally, are far more developed, and there are also more of the longitudinal pale marks on the back.

In size this bird is at once noticeably smaller than the preceding sub-species. Calcutta females have a wing of 3.32" (=84.3mm.) and males of 3.03" (=77.0mm.). Those from North-West, Central and West India are practically the same, whilst those from South India have them under 3.20" (=81.3mm.) and 2.93" (=74.4mm.) respectively.

This form occurs in its Easternmost limits in and about Calcutta, and specimens obtained in the Botanical Gardens of that city are very pale, quite as pale as many Southern Indian birds, but they are of an isabelline grey rather than a rufous, though one specimen has this colour considerably developed. From Calcutta it works Westwards, South of the Indian districts mentioned above, and by the time Manbhoon is reached we have a typical Southern Indian pale rufous bird. North and West it stretches away to Oudh and the North-West Provinces into Bombay, Cutch and Rajputana and South to the extreme limits of Madras and Travancore, also crossing into the North of Ceylon.

This sub-species is that which Sykes named *taijoor* from specimens obtained by him in the Deccan, and it will therefore stand as *Turnix pugnax taijoor* (Sykes, 1832).

In Ceylon we have yet another race which is, once more, darker above, approaching very nearly in colouration to the birds found in China and the Shan States, but it is less rich in general tint, not quite so dark, and has, in most of the females, a fairly well defined rufous collar on the nape and upper shoulders. In the numerous specimens of Southern Indian birds which I have examined, I can find no trace of this collar in any well-made and complete skin, and the Ceylon form seems to be exactly the same in every detail as that which is found in Java and Sumatra, which Ogilvie-Grant has divided from *taijoor* as a sub-species, named *pugnax*.

This sub-species is a considerably bigger bird than the Southern Indian form, females from Ceylon, Java and Sumatra—all much the same in wing measurements—having a wing of 3.33" nearly (=85.5mm.), and the male one of 3.05" (=77.5mm.).

This form being the one first described will bear the name *Turnia pugnax pugnax* (Temm., 1815).

Of the whole number of specimens of Bustard Quails examined by me during the preparation of this paper, I find there are but three of the British Museum collection which call for special attention.

The first of these is a bird collected for the Tweeddale Collection and marked Oudh. No particular locality in that Province is given and "Oudh" is probably wrong; the hand-writing in which the locality is written is not the same as that of the other details on the ticket, and the bird is possibly one from the Nepal Terai, N. of Oudh.

There are also two birds from the Deccan collected by Sykes, one of which is his type of *taijoor*, and a third which closely approximates three from Raipur in the Hume collection. The two former are exceptionally dark birds for the Deccan, but they are specimens which had been mounted in the Museum for many years, having been collected in 1863 and 1864, so that it is extremely probable that they have got dark and dull coloured, and have lost much of their red colour. Reds and yellows are the most quickly evaporating of all colour pigments in birds, and remembering this, there do not seem to be sufficient grounds to reconsider the sub-specific value of the colouration of the upper parts. Typical birds from the Deccan and Raipur are more than usually pale and red-coloured, and the most that could be said of these three birds is that they show a connecting link between *taijoor* and *plumbipes*, and on the whole they are nearer typical *taijoor* than typical *plumbipes*.

Of course, all four sub-species vary *inter se* to a considerable extent. Thus we find birds in certain areas in Burmah, such as Pegu, which are paler, more rufous, and also below the average in size when compared with typical dark Burmese specimens. At the same time, when series from various parts of the empire are collected and mixed together, there is seldom any difficulty in sorting them out without reference to their tickets. Southern Indian birds are very remarkably constant in their colouration, and there is no such thing as a skin from South of Madras being similar to one from N.-E. Bengal or Assam. As one works North and East, however, the colour of the upper plumage deepens somewhat, and the birds grow a little larger, so that at the extreme limit of range of each sub-species, specimens may naturally be obtained which are difficult to define.

KEY TO SUBSPECIES OF *pugnax*.

A.—Upper plumage very dark and boldly marked with black.

a. A rufous nuchal collar on female.

a² Wing about 3·05" ... *pugnax*. ♂

b² Wing about 3·30" ... *pugnax*. ♀

b. No rufous collar.

a¹ Upper plumage marked with rich rufous red.

c² Wing about 3·10" ... *atroregularis*. ♂

d² Wing about 3·45" ... *atroregularis*. ♀

b¹ Upper plumage equally dark but duller and with a paler rufous, less in extent.

e² Wing about 3·20" ... *plumbipes*. ♂

f² Wing about 3·50" ... *plumbipes*. ♀

B.—Upper plumage pale, a pale bright rufous red or isabelline predominating over the black.

g² Wing about 3·0" ... *taijoor*. ♂

h² Wing about 3·25" ... *taijoor*. ♀

The above key is admittedly a weak one, but this must always be the case when dealing with sub-species, the differences between which consist almost entirely in depth and intensity of colouring. Extreme types when placed close together bear but little resemblance to one another, but all sub-species intergrade on the confines of their habitat, and it is then extremely difficult to say to which sub-species they belong.

TURNIX PUGNAX PUGNAX (Temm.).

The Ceylon Bustard Quail.

Hemipodius pugnax.—Temm., *Pig. et Gall.* iii, p. 612, 754, (1815) (Java).

Turnix taijoor.—Jerdon, *B. of I.*, iii, p. 595 (part); Hume and Marsh., *Game B.*, ii, p. 169 (part); Legge, *B. of Cey.*, iii, p. 361; Oates in Hume's *Nests and Eggs*, 2nd ed., iii, p. 367 (part); Ogilvie-Grant, *Cat.*, B. M. xxii, p. 530 (part); A. L. Butler, *J. B. N. H. S.*, x, p. 313.

Turnix pugnax.—Sharpe, *Hand-List* i, p. 48 (part); Oates, *Cat. Eggs*, B. M., i, p. 69 (part); Ogilvie-Grant, *Game B.*, i, p. 265; Blanford, *Avifauna*, B. I., iv, p. 150 (part).

Vernacular names.—Kadai (*Ceylonese Tamils*) Waltuwa, Pundura-Waltuwa, Bola-Waltuwa (*Cinghalese*).

Description, adult female.—Upper plumage dull, rufous-red to dark, rather brownish grey, the head is usually a trifle darker than the other parts, whilst the rump and tail coverts may be slightly paler; feathers of the crown in the centre tipped white, often

forming a definite coronal streak, the rufous on either side more or less barred and spotted with black; lores, supercilia and sides of the head white with narrow margins or small spots of black; nape, shoulders and upper back finally barred with black, these parts, specially the nape, being often much spotted with white; a broad, well-marked nuchal collar of rufous, sometimes quite unmarked with other colours, rarely slightly spotted with black and white, on the lower neck and upper back; lower back, rump and upper tail coverts much more boldly barred with black and white marks, either lines or large spots on the outer webs of the lower back and rump feathers and the tips of the upper tail coverts; scapulars like the back, but often a little paler, still more boldly marked with black and white, the latter predominating. Wing coverts like the back, but rather paler, the greater and median boldly spotted with buff and black, the amount varying in individuals, and the buff on the outer webs often forming a fairly distinct broad bar across the closed wing: lesser coverts and shoulder of wing less conspicuously barred. Quills brown, not very dark, and bordered on the outer webs of the primaries with pale buff; primary coverts the same, but often much freckled or barred with buff; the innermost secondaries are like their greater coverts, and those nearest them are tipped pale and barred to a slight extent on the outer webs at their ends. Below chin, throat and centre of neck and breast, deep, velvety black; sides of lower neck and breast buffish white to buff, broadly barred with black, and a few bars extending across the breast below the black and the barring sometimes continued well down the flanks; remainder of lower parts rufescent buff to deep rusty buff, usually darkest on the vent and under tail coverts.

Under aspect of the wing and axillaries dark silver grey.

Colour of soft parts.—Legs and feet slate or leaden grey; bill dark bluish slate or plumbeous grey, the culmen slightly darker, especially at the base where it is quite a dark brown; irides white, occasionally yellowish.

"Irides white; bill light leaden, dusky brown on culmen; legs and feet pale bluish or fleshy grey, with the joints and tarsus washed with bluish" (Legge).

Measurements.—Total length about 5.3" (=134.6mm); wing 3.33" (=85.5mm); tarsus about 1.0" (=25.4mm); bill from gape about .65" (=16.5mm), and from front about .50" (=12.9mm), tail about 1" (=25.4mm). Legge gives the total length as about 6.3" to 6.5", and the wing as 3.4" to 3.55", but none of the specimens in the British Museum have a wing as large as this latter. Legge however includes Indian birds in his measurements, and those from upper India run very large.

Description, adult male.—Like the female, but has the chin white instead of black, the breast and foreneck banded black and buff

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like the sides, instead of pure black. As a rule, the markings are somewhat less bold in character, and the general appearance is duller.

Colours of the soft part.—As in the female, but iris, more often straw yellow.

Dimensions.—Wing 3.05" (=77.5mm), and other measurements proportionately smaller than in the female.

"Length 5.8" to 6.0"; wing 3.0" to 3.1"; tail '8" to 1.0";

"middle toe and claw 0.80"; bill to gape .67"." (Legge).

Young females only differ from the adult in having chin, throat and upper breast like these parts in the male.

Quite young birds of both sexes have the plumage similar to that of the adult male, but the black on the upper parts is more plentiful, though duller; the secondaries are more marked and freckled with buff or rufous, and the primaries are, perhaps, also rather more widely margined with the same. The breast is spotted with large drops of black which, sometimes, are rather arrow head in appearance, or sometimes become broadened into broken bars, but never form complete bars as in the adult. The variations in tail follows the same range as that of the old birds.

The nestling when hatched is covered with pale whitish buff on the lower parts, and dark chestnut buff above. There is a broad white line from the lores, through the eye to the nape, a dark coronal streak, almost black, and there are pale buff and black crescentic marks on the back; the wings have a dark and a pale bar, and the inside of the thighs are chestnut.

Certain naturalists have claimed that the black throat of the female is merely a seasonal change, and is lost after the breeding season. When a bird has as variable a breeding season as the Bustard Quail has, it is very difficult to assert that such is, or is not, the case; but the probabilities are all against it. The hen assumes this black during the process of a moult, and possibly takes two years before she fully acquires it, but birds may be found in *every* month of the year with this black fully developed. Hume obtained black-throated females in every month but September and January, and I have seen such specimens of this or the other sub-species in these months also.

Distribution.—Ceylon, Java, Sumatra and Billiton.

Legge thus records its habitat within the Island of Ceylon:—

"This Bustard Quail is scattered over most of the open country in Ceylon, being more numerous in some localities than in others. In the maritime districts of the Western Province, including the seaboard from Manaar southwards to Chilaw, and in suitable localities round the South-West coast, it is perhaps more common than elsewhere. Again, in portions of the Eastern Province where the ground is sandy and covered with low bushes, it is numerous, as in the

Yala district, where Mr. Bligh writes me it was abundant; and in the Northern parts of the low country it is found in old clearings overgrown with grass and shrubs, and also on open bushy lands on the borders of tanks. It is common in the Cinnamon Gardens, Negombo, Colombo, and Morotuwa, and breeds even in public resorts, such as the Circular, etc., where there are bushes to afford it the necessary cover."

Legge did not find it at any great elevations, but I have received it from nearly 4,000 feet, and doubtless it will be found even higher than this, provided there is suitable open country.

Nidification.—The nidification of this Bustard Quail is similar to that of the other sub-species, that of *plumbipes* being described at length hereafter.

Legge says that in Ceylon it lays "from February till May, and most likely has another brood later in the year." As with all these birds, it is the male which incubates the eggs, and Legge and Captain Butler both found the cock bird sitting on eggs. Apparently in Ceylon two eggs only are sometimes laid, a number which is very exceptional elsewhere. The eggs themselves cannot be distinguished in any way from those of *atroregularis* and *plumbipes* though they average a trifle smaller. Those which I have been able to personally measure averaged $\cdot 93'' \times \cdot 75''$ ($= 2.37 \times 1.90\text{mm}$), and Legge records their length as varying from $\cdot 90''$ to $\cdot 98''$, and the breadth from $\cdot 69''$ to $\cdot 75''$.

Habits.—Writing of the Ceylon Bustard Quail, the author above quoted, writes that it is—

"an inhabitant of open scrub, long grass dotted with bushes, the outskirts of low jungle, cinnamon plantations, and such-like situations where cover is combined with grass and rank vegetation. It is rarely found in damp spots and in fact is especially partial to sandy soil, which is the driest soil to be had anywhere in the maritime regions of Ceylon. It is only when accompanied by their young brood that these birds are found in coveys; they are generally met with singly, or two at some little distance from each other; they lie close, and when they rise, either fly back straight over your shoulder, or dart like an arrow round the nearest bush, suddenly alighting when out of reach of danger."

Legge also refers to their polyandrous habits, which they share with others of the genus, and describes the way the hens fight for the possession of the cock. He writes, "they fight like the common hen, stretching up their heads and trying to circumvent each other, pecking out vigorously all the while," and elsewhere he records that so intent do they become on their fights that he has driven up to and stopped his carriage within a few yards of a pair fighting by the roadside, without their taking any notice of him.

The voice of the hen is similar to that of other members of the family, and their food is also the same, *i.e.*, half vegetable and half insectivorous.

TURNIX PUGNAX PLUMBIPES.

The Burmese Bustard Quail.

Hemipodius plumbipes.—Hodg., Icon., ined. in Brit. Mus., Nos. 126, 127, *id.*, Bengal Sporting Mag., 1837, p. 346.

Turnix ocellatus.—Blyth, Cat. B. Mus., As. Soc., 1849, p. 29; Swinhoe, Ibis, 1863, p. 398 (Formosa); Godwin-Aus., J. A. S. B., xliii., pt. ii., p. 174; Jerdon, B. of I., iii., p. 597.

Turnix taijoor.—Oates, in Hume's Nest and Eggs, 2nd ed., iii. p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii. p. 530 (part); *id.*, Game B., i., p., 265 (part).

Turnix pugnax.—Gray, Hand-List B., ii., p. 271; Stoliczka, J. A. S. B., xxxix, pt. ii., p. 333 (part); Hume and Oates, Str. Feath., iii., p. 178 (Pegu); *id.*, Nest and Eggs, iii., p. 553 (part); Hume and Inglis, Str. Feath., v., p. 45 (Cachar); Ogilvie-Grant, Cat. B. M., xxii., p. 534; Sharpe, Hand-List i, p. 48 (part); Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna, B. I., iv., p. 150 (part); Stuart Baker, J. B. N. H. S., xii., p. 492; Inglis, *ibid.* p. 677; Mears, *ibid.*, xviii, p. 89; Harington, *ibid.*, xix., p. 365; *id.*, *ibid.*, xx., p. 377; *id.*, *ibid.*, xx., p. 1011; Venning, *ibid.*, xxi., p. 632; Hopwood, *ibid.*, p. 1215.

Turnix plumbipes.—Blyth and Wald., Cat. Mam. and B. of Burmah, p. 152 (1875); Oates, Str. Feath., v., p. 164; Hume and Davis., *ibid.*, vi., pp. 450, 521; Hume, *ibid.*, viii., p. 69; Scully, *ibid.*, p. 350; Hume and Marsh., Game B., ii., p. 177; Gammie, Str. Feath., viii., p. 453; Hume, Cat. No. 833; Oates, B. of Burmah, ii., p. 337; *id.*, Str. Feath., x., p. 236; Hume, *ibid.*, xi., p. 310.

Vernacular names.—Timokpho (Leptcha); Tinisk (Bhutia); Ngôn (Burmese); Sunsorai (Assamese); Daoduma (Cachari); Inruibuma (Kacha Naga); Vohbubum (Kuki); Pujoh Peyoo-Kabun (Malay); Guske-coone, Vock-coone (Siamese).

Description, adult female.—Similar to the Ceylon Bustard Quail, but wanting the rufous nuchal collar. It is also a rather darker bird with more rufous on the upper parts, and the black not quite so rich or velvety. The under parts are usually paler.

Adult male differs from the female as does the male of *pugnax*.

Colours of soft parts.—Same as *pugnax*.

Measurements.—The wing varies in length on an average between 3.40" (=86.4mm.) for Burmese birds and 3.51" (=89.9mm.) for North-East Indian female birds, and from 3.09" to 3.24" respectively for the males. Hume gives the measurements as follows:—

"Females—length, 5.44" to 6.37"; expanse, 11.0" to 12.5"; wing, 3.0" to 3.45"; tail from vent, 0.9" to 1.38"; tarsus,

0.9" to 1.02"; bill from gape 0.68" to 0.78"; weight 1.7 to 2.25 oz."

"Males—length, 5.6" to 6.25"; expanse, 10.9" to 12.3"; wing, 3.12" to 3.5"; tail from vent, 1.0" to 1.4"; tarsus 0.95" to 1.12"; bill from gape, 0.7" to 0.81"; weight 1.5 to 2.65 oz."

I give Hume's measurements and weights in full, but cannot understand them, as they are almost exactly contrary to my own measurements, which, in agreement with other observers and naturalists, shew the female to be a decidedly bigger bird than the male. Jerdon gives the wing measurement of this form as 3.6", and says that the male is smaller.

Distribution.—Federated Malay States and West Siam, the Plains of Burmah and the whole of the Western and Southern Burmese Yomas, or Hill tracts; the North and North-West Chin Hills, Chit-tagong and its Hill tracts, the whole range of country, plains and hills, extending West as far as Sikkim throughout Assam and the Bengal Dooars and Nepal, together with the wetter, better forested districts at their base, from Mymensingh to Bettiah in Behar where however it meets the Southern form *taijoor* and intergrades with it.

Nidification.—They breed practically all the year round, principally between April and September, and one hen will apparently go on laying eggs as long as she can find a supply of husbands to hatch the eggs she lays and to look after her innumerable progeny when hatched.

Dr. H. E. Butler, quoting from the German of Huth, tells us that in 1890, a female *Turnia nigricollis* laid no less than 8 clutches of eggs, and from 3 of these young were hatched. It must, however, be noted that Huth speaks of the female of this species as being "a pattern of love, attention and solicitude towards the little chick."

I have had *plumbipes*, *tanki* and *dussumieri* in captivity, but I found that though I could keep any numbers of the males together, I could not keep two females, as they always fought until one was disabled. Unfortunately I never managed to induce them to breed, though the hens would drop casual eggs here and there, of which they took no notice.

It is the cock bird that has to do all the hatching and looking after the young, and the hen, as soon as she has laid her first set of eggs, goes off to hunt up another male to look after her second, and so on, until matrimony palls for the season, and she either indulges in lonely blessedness or joins one or two other ladies who are also grass widows for the time being.

The male, having hatched the eggs a process which takes about twelve days, then looks after the young and brings them up, performing his duties in the most admirable manner, feeding, tending them with the greatest solicitude, brooding them at night and

fighting for them against all possible enemies, sometimes, including their mother, with the greatest bravery.

Whether, when in a state of freedom, having brought up one family, he thereupon undertakes the duties of a second it is impossible to say; but in captivity, when he is the only gentleman available, the lady generally enforces these duties upon him, at least twice, if not more often.

As regards the nest, Hume says:

"Sometimes this species makes no nest at all, and merely scratches a hollow at the base of, or in the midst of, some tuft of Sirpatta grass, or occasionally some little dense bush adjoining or surrounded by long grass. Sometimes it makes a little pad of rather soft, dry grass, three, or at most, four inches in diameter, and half an inch in thickness, which it places as a lining to the hollow."

"Generally it does scratch a hollow for itself, but at times natural hollows or the hoof prints of cattle are accepted and used, with or without a lining, without so much as a trace of the lazy little bird's feet being visible."

Hume adds an amusing account of how the male is forced, according to native ideas, by the female to sit on the eggs, and

"thereafter gives him a tremendous thrashing if ever she catches him away from these . . . an old Moghul Shikari . . . used to aver that he had often watched the males feeding near the nest, rush on to the eggs at the sound of the female's call, and sit there looking as if they had not left the nest for at least a week, until the female appeared, walked once or twice round the nest, and strutted off again, calling vociferously, as much as to say, 'Lucky for you it's all right, my little friend'".

Hume in writing this includes all the different forms, and it is quite possible that his description is quite accurate in so far as it refers to the Common Bustard Quail of the Plains.

Personally, though I have seen many hundreds of nests of *plumbipes*, I have never seen the eggs laid on the bare ground. As a rule the nest is placed just inside scrub, grass, or bamboo jungle alongside some open piece of ground, and a very favourite place for the nest is at the edges of the paths used by the hill villagers. These paths are cleared every year for a width of some 6 to 10 feet, but each rainy season the grass springs up and covers, more or less thickly, all but the centre, which is trodden hard by the constant traffic. Time after time when walking or riding along these primitive tracks, I have put up the bird from my feet, and looking down have seen the eggs snugly tucked away at the roots of a thick tuft of grass.

In nineteen cases out of twenty, or perhaps even more, the nest consists of a thick pad of fine grass from $3\frac{1}{2}$ to $4\frac{1}{2}$ inches in di-

meter, fitting into some natural hollow, deepened, cleared, and made circular by the birds themselves. In the centre the pad is from $\frac{1}{2}$ to $1\frac{1}{2}$ inches deep, and the sides curl up a little with the sides of the hollow. Often the nest is wedged in amongst the actual roots of a tuft of grass, the central blades being beaten down or forced aside to form the requisite space, and the softer parts of the broken grass helping to form the pad itself. As a rule the midribs of the coarser grasses are discarded, and only shreds from the sides of the blades used, but now and then one may find a few roots, tendrils, fern fronds, or other similar materials made use of in the construction of the pad. When made in comparatively thick grass, more especially where this is sundried or withered, the Bustard Quail sometimes makes a regular domed nest, though I have never seen one made as elaborately as that described by Dr. Seth Smith as being built by *Turnix tanki*. I think, as a rule, the dome is as much accidentally as purposely made; the birds get into a tangle of grass, more or less withered and broken down, and in making the foundations for the nest pad, they force themselves this way and that, push pieces of grass to one side or upwards, and thus make a hollow which they line and over which the twisted grasses are made into a dome.

The number of eggs laid is normally four, and this number is very rarely exceeded, and three eggs, hard set, are just as rarely found in a clutch.

Jerdon talks of as many as eight eggs being laid in the same clutch, and Hume says that in thirty nests taken by himself he has seen two clutches of five and one of six. I am afraid to say how many nests I have seen of this bird, but it must be nearer a thousand than five hundred, yet amongst all these I have known but one clutch of six eggs—that was brought to me—and perhaps four of five eggs.

In North Cachar I have seen—not necessarily taken—as many as a dozen nests in a day, and I worked this district for fifteen years; after this I was in Dibrugarh five years and in the Khasia Hills yet another five, and in both places *Turnix pugnax plumbipes* was most plentiful; certainly no year has passed without my seeing twenty clutches of its eggs.

After this experience it may be safely asserted that clutches of anything but four eggs are abnormal.

In shape the eggs are generally broad ovals with the small end pointed rather sharply, and they vary from broad obtuse ovals to typical, if squat, peg top shaped eggs. The normal egg has a greyish white ground colour, sometimes tinged with a suspicion of yellow or red, and they are covered all over with innumerable dots and specks of dull yellowish and reddish brown with other spots and blotches, some so dark as to appear dull vandyke brown or black.

The secondary markings are of pale purple or lavender grey, but are in most cases almost obliterated by the superior markings.

In some eggs the markings are all reduced to the very finest dots, in others they are all rather bolder, and in others again the two are intermixed. In a few the big dark blotches outnumber the smaller marks and give a more handsome appearance to the egg. As a rule the spots, etc., of whatever nature they may be are distributed thickly all over the egg, but even more so towards the larger end where they sometimes form a well defined ring or cap, the markings in which are bolder and darker than elsewhere.

In a few eggs in my collection the ground colour is decidedly reddish, and the markings, which consist of reddish and deep brown, are very large and handsome, giving the whole egg quite a bright red tint. Fewer still than these, but yet now and then met with, are eggs in which yellow predominates rather than red.

The surface is fine and close, and often has a considerable gloss, and the shell is very stout for so small an egg. The internal skin is pure white.

The average size of the eggs of *Turnix pugnax plumbeipes* is exactly $1.0'' \times .82''$ ($=2.54 \times 2.08$ mm.) and they range in length from $.89''$ to $1.16''$ ($=2.25$ to 2.94 mm.), and in breadth from $.76''$ to $.89''$ ($=1.93$ to 2.25 mm.); the average given is that of 526 eggs.

Habits.—This Bustard Quail is found at all heights up to 8,000 feet, and again well out into the plains, but though it is a bird of more or less open patches of country, it is also essential that such open country should be interspersed with forest and jungle, and well watered.

Hume seems to have thought that to a certain extent Bustard Quails are migratory, moving about according to the season in the plains and higher or lower in the Hills in the hot and cold months. In the drier portions of their habitat in the plains, it is probable they are only to be found after the rains commence, leaving them again as soon as the winter drought begins to take effect, but as regards elevation, heat and cold seems to have no effect, and they may be found at Darjiling at 8,000 feet elevation all the year round. So also in the North Cachar, Khasia and Naga Hills they may be found equally numerous all the year, either in the plains at their foot, or in the higher hills. In North Cachar I found it quite common at 6,000 feet in December and January.

It may be found in almost any kind of country other than dense forest without openings, or, the opposite extreme, sandy open grass land without any forest near it. Perhaps it prefers, above all other kinds of ground, thin grass or scrub jungle, more or less broken up with bare patches or with cultivation. At the same time, it may be

found almost equally often in bamboo jungle or in thin tree forests which have lots of low grass or other light undergrowth.

In North Cachar it was extraordinarily numerous, and one could not go along the narrow village paths for an hour's walk or round any field of Hill-rice without putting up several. In the plains I have nowhere seen them so common as this, and Hume, writing of the Burmese form, *plumbipes* in comparison with the Indian form, *taijoor*, says:

"They seem to me to be more sparsely distributed than is the Indian bird. Of the latter you might in many places, with good dogs and small charges, bag by hard work at least a dozen, and possibly twenty couple in a day, whereas, from what I know myself, and from what I hear from others, I doubt if you could anywhere shoot even half the number of *plumbipes*, fag as you might."

I think, however, there are some places in North Cachar where one could get as many as twenty couple in a day *if* any one ever desired to get them, but, of course, it would be necessary to cover a lot of country, have some useful dogs to help, and also hold straight.

They are not really as easy birds to kill as one would imagine, until their ways are learned. They generally get up very close to the shooter, often at one's very feet, and they then buzz straight off for some twenty yards or so, and tumble headlong into the grass again. They fly at quite a good pace, though perfectly straight, in fact, very much as a common Quail does; but they are so tiny that if fired at close, and hit, there is nothing left to pick up, and if time is allowed for them to get a fair distance, they take advantage of it to make one of their disconcerting dives into the grass. Many men will not agree with the dictum that there is no sport in shooting them, as one has to be very quick to kill these little birds with any certainty, and, once missed, there is little chance of ever seeing them flushed again. Where the grass and bushes are extensive, even good dogs find it a hard job to flush a bird twice; but I think they generally rise fairly well the first time, though even then not until they are almost trodden underfoot by the gunner or caught by his dog.

It is a wonderful little runner, and seems to be able to keep ahead of the fastest dog in grass or bush if the latter tries to follow it up by scent, and if the dog tries to rush it, it just slips to one side, and allows the animal to shoot past it. I had a very good example of this once when shooting some of these Bustard Quail for specimens in a patch of grass half eaten down by village buffaloes, and intersected in all directions by small paths and buffalo tracks. I had two Bhutia dogs with me, both keen sportsmen, with excellent noses but impetuous temperaments, and the dogs and I had all seen three or four of these Bustard Quail driven into this patch from others a few yards away. The patch was not 10 yards wide by 50

long, yet in half an hour's bustling we got but one bird, and that I shot as he raced across a strip of open to another patch. Three or four times a bird would come out a foot or two into the open and then double back as one of the dogs came rushing past it.

Although such a little skulker, the Bustard Quail by no means shuns humanity or human habitation, and is often found in gardens of bungalows, scraps or bush and grass round about, and even in the middle of villages. They are common in tea gardens, and feed continually within very short distances of women plucking tea, or men hoeing the ground between the bushes. In many parts of India they seem to be peculiarly partial to the borders of rough grass growing at the edges of tanks, and to the softer grass in Mango topes or orchards. In Sylhet and Cachar I also often found them in small strips of dry grass land surrounded on all sides by water and swamp, and we often added one or two to our bag when out snipe shooting by making a man beat the small pieces of high grass land dotted about here and there in amongst the rice fields.

It is an excellent article of diet, and Bustard Quail on toast, though a much smaller, is quite as excellent a morsel as any real Quail.

In this species, as in all others of the genus, the female bird is the one which "wears the breeks" in their family arrangements, and it is she who fights for the male whom, when fought for and won, she completely dominates and henpecks. In a wild state, the hen bird attracts the male to her with a loud booming call, generally described as a purr or as a cross between a purr and a coo. Dr. Seth Smith writes of their call:

"The call note uttered by the Hemipodes seems to be much the same with all,—a soft booming, which is more or less ventriloquial. The female utters the note far more frequently than the male, and I am not sure that he calls at all, but I believe he does occasionally. This note may be almost called a 'Coo'; I have frequently mistaken it for the coo of the Bronze-winged Pigeon in the distance. Some writers have likened it to the distant bellowing of a bull, and the Mediterranean form, *T. sylvatica*, is known as 'Torilla' or 'little bull'."

The sound is also not unlike the deep guttural purr, or grunt of a tiger, and sometimes, when hurrying along a lonely jungle path as evening was coming on, it would give one quite a start to hear the call come soft and deep from just behind. On moonlight nights the female birds call incessantly during the breeding season, and in the stillness and darkness their voices sound extraordinarily loud. I think the bird often mounts on any convenient hillock to "boom", but she never gets on to a stump or branch. Her attitude when calling is crouched rather low on the ground with her wings outspread on either side and gently quivering.

The females are very pugnacious at all times, though more especially so when breeding, and their pugnacity is taken advantage of by natives of many parts of the country to entrap them. Jerdon thus describes how the first cousin of this bird, *taijoor*, is caught in the South of India:

"For the purpose a small cage with a decoy bird is used, having a concealed spring compartment, made to fall by the snapping of a thread placed between the bars of the cage; it is set on the ground in some thick cover, carefully protected. The decoy bird begins her loud purring call, which can be heard a long way off, and any females within earshot run rapidly to the spot and commence fighting with the caged bird, striking at the bars. This soon breaks the thread, the spring cover falls, ringing a small bell at the same time, by which the owner, who remains concealed near at hand, is warned of a capture, and he runs up and secures his prey and sets the cage in another locality. In this way I have known 12 to 20 birds occasionally captured in one day, in a patch of thick, bushy jungle in the Carnatic, where alone I have known this practice carried on. The birds that are caught in this way are all females, and in most cases are birds laying eggs at the same time, for I have frequently known instances of some eight or ten of these captures, so far advanced in the process as to lay eggs in the bag in which they were carried, before the bird catcher had reached his house."

In North Cachar the Nagas had a somewhat similar way of catching them. A hen bird was pegged down by one leg to the ground by a piece of string about a couple of feet long, and all round her, at a distance of five feet or so, where the ground had been partially cleared, were placed innumerable nooses of goat's, or mithun hair tied to inconspicuous creepers.

As soon as the decoy bird settled down, the Naga would get behind a bush, whilst I, when I looked on, would select a tree where from a few feet above the ground one could see all that took place. After being left alone for a few minutes, the hen would preen and clean herself, and presently start booming, at first sitting up in a semi-erect position, but gradually lowering her breast to the ground, with out-stretched wings, and blowing herself out with each boom until she looked like a little feather balloon. As a rule we had not long to wait before there was an answering boom, and almost immediately a Bustard Quail would slink up and, if not caught in one of the outer nooses, would also squat a second or two and then boom back at her opponent once or twice, after which she would rush headlong to the fight. As a rule she was caught at once in the nooses, but sometimes she would escape these and, seizing on the tethered female, engage in a mortal combat. In such cases the

two birds always seemed so keen on the fight that it was easy to throw a cloth over them and secure the wild with the tame.

That the boom is a call to the male as well as a challenge to the female was shown by the fact that cock birds as well as hens were sometimes caught. I once saw a male snared, and his attitudes and modest demeanour as he approached his lady love were most amusing. There was no cooing or purring on his part, but he slunk up close to where she was and then squatted in the grass, back to her, and some six feet away. Here he lay quite still while she boomed away, bowed, danced, and scraped to him in a perfect ecstasy, yet prevented from approaching any nearer to him by her tether. At last, seeing that she would not go to him, the male commenced sidling up to her, only a few inches at a time, until he stepped into a noose, and was trapped.

So pugnacious are these birds that they will often continue to fight in their small cages almost immediately after they are trapped, and it would be impossible to keep breeding hens together with any safety.

TURNIX PUGNAX TAIJOOR (Sykes).

The Common Bustard Quail.

Hemipodius taijoor.—Sykes, P. Z. S., 1832, p. 155 (Deccan) Bengal Sporting Mag., 1836, p. 171.

Turnix taijoor.—Jerdon, B. of I., iii, p. 595 (part); Ball, Str. Feath., ii, p. 428; Stoliczka, J. A. S. B., xlii., pt. ii., p. 250; Butler, Str. Feath., iv., p. 7 (N. Guzerat); David. and Wen., *ibid*, vii, p. 87 (Deccan); Ball, *ibid*, vii, p. 226 (Ganges to Godaveri); Hume and Marsh., Game B. ii. p. 169 (part); Vidal, Str. Feath., ix., p. 77 (S. Konkan); Butler, Cat. B. of S., Bombay, p. 70; Hume, Cat. No. 832; Ball, Str. Feath., ix., p. 424; David., *ibid*, x., p. 317 (Khandesh); Davison, *ibid*, p. 412 (Mysore); Macgregor, *ibid*, p. 441 (Deccan); Taylor, *ibid*, p. 465 (Mysore); Macphersow, Str. Feath., *ibid*, p. 119; Barnes, B. of Bombay, p. 317; Butler, B. of Sind, p. 55; Oates, Hume's Nests and Eggs, 2nd ed., iii., p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii., p. 530 (part); *id.*, Game B., i., p. 265 (part); Barnes, J. B. N. H. S., vi., p. 9.

Turnix pugnax.—Butler, Str. Feath., v., p. 222 (Deesa); Fairbank, *ibid*, p. 409 (Palni Hills); Sharpe, Hand-List, i., p. 48 (part); Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna B. I., iv., p. 150 (part); Moss King, J. B. N. H. S., xxi., p. 101; Whitehead, *ibid*, p. 168.

Vernacular names.—Gulu, Gundlu, Gundra, Salui-gandra (*Hind*), Pured, female, Kalada, male, (*Telegu*), Kurung-kadik, female, Ankadik, male, (Tamil); Durwa, (*Ratnagiri*), Karechaki, (Canarese).

Description, adult female.—Differs from *pugnax* in being much paler and much more rufous, many birds appearing, as a whole, to

be a bright, but rather pale rufescent red. The pale fulvous edges to the feathers of the back, scapulars, etc., are larger and paler, increasing the pale effect of the plumage, and the under parts are generally very much paler. The black spots on the wing coverts, though smaller, are more in the nature of bars than they are in either of the other three sub-species.

In birds from the neighbourhood of Calcutta, the rufous tint is replaced by a beautiful pale isabelline, the general tone being even paler still; the birds from Western Bengal are intermediate between the two.

Colours of the soft parts.—As in *pugnax*.

Measurements.—The Common Bustard Quail follows the general avian rule in being smaller than its more Northern and Eastern representatives.

The British Museum series—a large one—give an average wing measurement for females of just 3.25" (= 82.5 mm.), but the average is raised by the comparatively large size of some of the Calcutta birds, which average 3.32" (= 84.3 mm.).

Adult male.—Differs from the female much in the same way and degree as does that of the other sub-species.

Measurements.—The male, as usual, is decidedly smaller than the female, the Calcutta males average for the wing 3.03" (= 77 mm.), and the others from the Peninsular of India 2.93" (= 74.4 mm.). Hume's measurements for this form agree with mine in so far as they make the male out to be smaller than the female, but his wing dimensions greatly exceed mine.

"Females—Length, 6.12" to 6.7"; expanse, 11.75" to 12.75"; wing, 3.4" to 3.7"; tail from vent, 1.0" to 1.4"; tarsus, 0.95" to 1.12"; bill from gape, 0.7" to 0.81"; weight, 1.5 to 2.56 oz."

"Males—Length, 5.6" to 6.25"; expanse, 10.75" to 11.7"; wing, 2.85" to 3.1"; tail from vent, 0.9" to 1.2"; bill from gape, 0.6" to 0.72"; weight, 1.5 to 1.9 oz."

From the above it will be seen that Hume makes out *taijoor* to be as big a bird as *pugnax*, but it is rather difficult to say what Hume exactly included in the two sub-species so that for matters of comparison his figures are not of much value, though they are, otherwise, of the greatest interest.

It will be seen from what I have written above that birds from South-Eastern Bengal are larger than elsewhere, and are also distinguished by the curious isabelline tint of their plumage. There is not at present much material from this part of India to work on, but if further material, when obtained, corroborates what is now known, the bird will require to be separated subspecifically and given a new name, as there does not seem to be one at present applicable to it.

Distribution.—The whole of India South of the habitat of *plumbipes* down to Cape Cormorin. It is said also to enter Ceylon, but I have seen no skins which are not referable rather to the true *pugnax* than to *taijoor*. It has not yet been recorded from Sind, but I have recently had it sent to me from the Punjab, where it would appear to be only a rare straggler.

Nidification.—Not to be distinguished in any way from that of *plumbipes*, though, if Hume is correct, this continental form would appear very often to be contented with laying its eggs in some hollow without making a true nest. Even in such cases, however, a rough collection of scraps of grass, etc., are always placed in the hollow before the eggs are laid.

The season for laying may vary somewhat in different places, but it may really be said to last more or less all the year round. Scarcity of food naturally checks breeding so that in the driest portions of its habitat the driest months of the year will form a gap in breeding operations, and on the contrary when the rainfall is heaviest, the birds will cease breeding during the height of the rains.

The eggs are exactly like those of *plumbipes* and vary to the same extent, but average a trifle smaller, about $\cdot 92''$ ($= 2.34$ mm.) \times $\cdot 76''$ ($= 1.93$ mm.).

In Hume's "Nests and Eggs" Oates gives the average of 30 eggs, practically all from Southern India, as $\cdot 94'' \times 0.78''$ ($= 2.37 \times 1.98$ mm.); and in the Catalogue of Eggs in the British Museum he again gives the extremes of measurement, for the same series, *i. e.*, between $\cdot 8'' \times 1.04''$ ($= 20.3 \times 26.4$ mm.); in length $\cdot 71''$ to $\cdot 85''$ ($= 18 \times 21.6$ mm.) in breadth, but these measurements include the Eastern and Formosan eggs.

TURNIX PUGNAX ATROGULARIS (Eyton).

The Chinese Bustard Quail.

Hemipodius atrogularis.—Eyton, P. Z. S., 1839, p. 107.

Turnix taijoor.—Oates, in Hume's Nests and Eggs, 2nd ed., iii., p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii., p. 530 (part); *id.*, Game B., i. p. 265 (part).

Turnix pugnax.—Sharpe, Hand-List, i., p. 48; Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna B. I., iv., p. 150 (part).

Vernacular names.—Guske-coone, Nock-coone (Siamese); Ngôn, (Burmese).

Description, adult female.—This is the most richly coloured of all the forms of the Bustard Quails, the upper parts being very boldly marked with black and deep rufous, the latter of a darker, redder tint than is found in any of the other sub-species.

The colours of the soft parts are the same as in *pugnax*.

Measurements.—Females—Wing varying between $3.32''$ ($= 84.4$ mm.) and $3.56''$ ($= 91.2$ mm.), and averaging $3.45''$ ($= 87.6$ mm.).

The males as usual are decidedly smaller with a wing of only 3.10" (=78.6 mm.).

Distribution.—Formosa and thence through South and Western China through the hill ranges and thence into the South-Eastern Shan States.

Nidification.—Exactly the same as that of *plumbipes*, and the eggs are not to be distinguished from those of the latter bird.

Habits.—So far as is recorded, there appears to be nothing to note in the habits of this bird differing in any way from those of its nearest relations. It is found alike in the Plains, and certainly up to 4,000 feet, and probably higher in the mountains. Like the other Bustard Quails also it keeps much to openings in partly forested country, and is often found in cultivation and round villages.

TURNIX DUSSUMIERI.

The Little Button Quail.

Hemipodius dussumieri.—Temm. Pl. Coll., v., p. 454 (1828).

Hemipodius variabilis.—Hodg., Bengal Sport. Mag. (1837), p. 345.

Hemipodius sykesi.—Smith, Ill. Zool. S. Afri., ii. (1838).

Turnix dussumieri.—Blyth, Ibis (1867), p. 161; Gould B. of Asia, vii., pl. 10 (1869); Hume Str. Feath., i., p. 227; Adam, *ibid*, ii., p. 338; Ball, *ibid*, p. 428; Butler, *ibid*, iv., p. 9; Fairbank, *ibid*, pp. 262, 266; Davis and Wen., *ibid*, vii., p. 87; Hume, *ibid*, pp. 186 and 226; Butler, *ibid*, p. 186; Ball, *ibid*, p. 226; Cripps, *ibid*, 298; Butler, Cat. B. of Sind, p. 56; Hume and Marsh., Game B., ii., p. 193; Hume, Cat. No. 835; Vidal, Str. Feath., ix., p. 77; Butler, Cat. B. S. Bom., p. 70; Reid, Str. Feath., x., p. 64; Oates, *ibid*, p. 237; Davidson, *ibid*, p. 318; Oates, B. Burmah, ii., p. 336; Hume, Str. Feath., xi, p. 312; Barnes, B. of Bom., p. 319; Ogilvie-Grant, Cat. B. M., xxii., p. 540; Oates, in Hume's Nests and Eggs, 2nd ed., iii., p. 371; Blanford, Avi. B. I., iv., p. 152; Oates, Game B. I., i., p. 11; Ogilvie-Grant, Game B., ii., p. 273; Le Mess, Game S. & W. B., p. 114; Sharpe, Hand-List, i., p. 48; Oates, Cat. Eggs, B. M., i., p. 71; Barnes, J. B. N. H. S., vi., pl. i., fig. 825; Stuart Baker, *ibid*, xii., p. 493; Moss King, *ibid*, xxi., p. 101; Whitehead, *ibid*, xxi., p. 169.

Turnix sykesi.—Jerdon, B. of I., iii., p. 600; King, J. A. S. B., xxxvii., pt. ii., p. 216; Godwin-Austen, *ibid*, xliii., pt. ii., p. 174.

Vernacular names.—Ginwa Lawa, Chota Lawa, Dabki, Tura Shimaj (*Muttra*), Libbia (*Purnea*), Darwi (*Ratnagiri*), Chinna or Tella-dabba Gandla (*Telugu*), San Gundla (*Ooriya*), Choto San-sorai (*Assamese*), Dao-duma kashiba (*Cachari*), Inrui-buma gajeba (*Naga*), Tutu-butera (*Sind*), Ngong (*Burmese*).

Description, adult male and female.—A distinct mesial stripe from forehead to back of crown pale buff, sides of the crown rufous brown to brown, generally much mixed with black, whereas the

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mesial stripe is often unspotted and seldom heavily marked; lores, supercilia and sides of the head white, or buffy white, speckled with black; back of the neck ferruginous red to dull ferruginous; back, rump and upper tail coverts barred black and rufous, the rufous varying from a bright tint to a dull greyish rufous, and the amount of black varying greatly in individuals; here and there, more especially on the rump, a few of the feathers are very narrowly margined with whitish, and some of the outer tail coverts have the outer webs edged with buff; the black is nearly always more strongly developed on the rump and upper tail coverts than on the back.

Scapulars, inner wing coverts, and innermost secondaries like the back, but with broad buff margins to each feather; other wing covers rufous with a black spot on the outer web, and broad buff margins, in some birds this buff margin occupying nearly all the visible portion in the closed wing; bastard wing and primary coverts grey brown with buff edges; primaries brown, or grey brown, with buff edges, broad and distinct on the outer, narrow and sometimes abraded on the inner.

Chin and throat white, centre of breast rufescent, sides of breast and flanks white or buffy white, with bold drops of black, and more or less patches of chestnut; remainder of lower parts white, often tinged buff and sometimes with chestnut, and the lower tail coverts nearly always of this colour.

Colour of the soft parts—

"Legs and feet vary from pale fleshy white to light lead colour; the bills from leaden white to lavender or plumbeous; the irides are light yellow to straw white." (Hume).

"Legs fleshy white or pale blue grey, bill the same."
(Finn in "Indian Field").

Measurements.

"Females—Length, 5.4" to 5.7"; expanse, 9.8" to 10.7"; wing, 2.8" to 3.0"; tail from vent, 1.3" to 1.5"; tarsus, 0.7" to 0.75"; bill from gape, 0.51" to 0.56"; weight, 1.25 to 1.5 oz."

"These measurements, taken from only 6 birds . . . probably do not adequately represent the limits within which the dimensions of this species vary."

"Males—Length, 5.2" to 5.4"; expanse, 9.5" to 10.5"; wing, 2.76" to 2.9"; tail from vent, 1.25" to 1.35"; tarsus, 0.7" to 0.72"; bill from gape, 0.51" to 0.55; weight, 1.1 to 1.4 oz." (Hume).

Including the birds in the British Museum, I have obtained measurements of 34 males and 43 females. The latter have an average wing measurement of 2.93" (= 74.4 mm.) and vary in length between 2.88" (= 7.31 mm.) and 2.98" (= 7.57 mm.)

The former, the males, average only 2.57" (= 5.43 mm.). In length of wing the longest is 2.80" (= 7.11 mm.), and the shortest 2.42" (= 6.14 mm.).

Young birds.—

"In the young birds the whole of the upper plumage is reddish brown, becoming brighter rufous on the nuchal region, and indistinctly barred with blackish brown and spotted with white, especially on the wing coverts and chest. The latter is paler buff than that of the adult, and spotted all over with black." (Ogilvie-Grant).

The nestling in down is not distinguishable from the nestling of *Turnix pugnax*.

It is quite impossible to divide this little Bustard Quail into sub-species. Two specimens from Formosa, both females, in the British Museum Collection can be picked out from the rest by their rich plumage, as can one from Sambalpur, another from the Deccan, and yet one more from East Burdwan. All these five are, however, identical, and their distribution over so scattered an area at once disposes of the question of their difference in colouration being of a subspecific value, moreover they are closely approached by a few specimens from Raipur and other parts of Central India.

It is curious to note that specimens from Pegu are rather paler than birds from other parts of Burmah, just as are specimens of *Turnix pugnax*, though these latter agree with the dark Malayan and Eastern form rather than with the South Indian ferruginous bird.

The range of variation in *Turnix dussumieri* is not nearly as great as it is in *Turnix pugnax*, and consists principally in the amount of black barring in the upper plumage, and the extent of the buff margins to the feathers of the wings and scapulars. As these are plentiful, or the reverse, so is the general aspect of the bird itself, dark or pale. The rufous of the nape and neck does not vary much in colour, though a good deal in extent, but the rufous of the upper back is often a more grey brown than a red, and this, of course, also affects the general appearance considerably.

Distribution.—This tiny Game Bird is found practically throughout India, as far South as Travancore, from the Southern part of which I have received two male specimens with their eggs. From this State it extends North in every direction as far as the Himalayas, ascending them to at least the height of 8,000 feet. It occurs in all the Hill Ranges of Assam, and I have personally often taken it in the Khasia Hills, Cachar Hills, Naga Hills, and up the Assam Valley, as far East as Dibrugarh and Sadiya. It is also found in Cachar, Sylhet, Tippera, Chittagong, and the Chittagong Hill Tracts. Further East it has been obtained by one of my native collectors in the Shan States. Oates got specimens in Pegu and Swinhoe obtained it in Formosa and Hainan.

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Doubtless it will be found to occur in all the districts of Burmah, and through the lower Hill Ranges into Western China.

As regards elevation, it certainly ascends as high as 8,000 feet, as it has been found above Darjeeling, above Simla, and nearly as high on the highest peaks of North Cachar, and on the highest parts of the Nilgherries where, however, it seems to be extremely rare.

Naturally from certain parts of the country it is debarred by the heaviness and denseness of the forest, or, on the other hand, by the dryness and bareness of the plains. To the North-West it, perhaps, only wanders during the Rains, and in these parts is semi-migratory, to the extent of moving when, literally, a place becomes too hot to hold it. Elsewhere it is certainly a resident bird, breeding wherever found.

Nidification.—With this, as with the other *Turnicidæ*, the female bird is the one who courts the male, and fights with the other females for him. She is just as pugnacious as her larger relatives, and, sad to relate, is just as negligent of her maternal duties, and of her moral obligations. Until she has won her husband, she will fight for him as if he was the one and only thing she desired in this life, but her frenzy of love soon dies, and after a very short spell of wedded life, she leaves the poor little henpecked husband to hatch the four eggs she has laid, and wanders forth in search of new adventures and more husbands.

Her purr, coo, or boom, however, we may describe her call, is, I think, a good deal softer and weaker than that of the bigger Bustard Quail, but is otherwise of exactly the same description, and is uttered in the same way, and for the same purpose, *i.e.*, to call the male or to challenge another female. Captain Butler told Hume that its call was—

“a mixture of a purr and a coo, and when uttering it a bird raises its feathers and turns and twists about much in the same way as an old cock pigeon;”

and he might have added, with the same motive, that is to say, in order to captivate its mate.

Doubtless this bird, like the others of its genus, breeds more or less throughout the whole year; but, perhaps, it is not quite so irregular as the common Bustard Quails. Generally speaking, it may be said to breed principally from April to October, and more especially from June to September. The hen must lay several clutches in the year, for she will go on breeding apparently as long as she can find husbands to hatch her eggs and bring up her young. In North Cachar I found this bird called and bred from late in April to the end of August; but in the Khasia Hills, adjoining these, she began in early April, and went on until late in September, a difference, doubtless, due to the excessive rainfall in parts

of the latter district. Davidson considered it a late breeder, and recorded:—

“In Sholapur I got, or had brought to me, four nests, one on the 17th August, and the others at the very end of September, and I shot a hen in October, 1878, containing one unshelled egg.

“In the Panch Mahals, I shot a bird containing a perfect very highly coloured egg late in October.”

Theobald also found them breeding in the Punjab late in August, and near Deesa Captain A. E. Butler found eggs from the end of May to the end of August.

In Behar and Bengal, Coltart, Inglis, Hervey and others have found it breeding during the rains only, commencing at the end of June and continuing until the end of September.

The nest is similar to, and is placed in the same kind of position as that of the last bird, and requires no separate description but I do not think it is so often domed or covered in. I may have seen some 40 or 50 nests of this bird, all told, but I do not think I have seen half a dozen of this description.

The number of eggs laid is almost invariably four, and I have never seen a complete clutch with less, and only four nests with five eggs in them, and never one with six.

The ground colour of the eggs is generally greyish white, occasionally yellowish white, or still more rarely, with a faint reddish tinge. The whole surface is closely stippled or speckled and spotted with minute spots of yellowish or greyish brown, with here and there rather largish spots, and small blotches of blackish brown, in some cases a rather rich reddish brown. As a rule, these bolder markings are rather sparse and rather small, but in a few clutches they are numerous and bold, some of the blotches being as much as .2" in their longest diameter. Most eggs have the superior markings of all kinds fairly equally distributed over the whole surface, but in some the bolder blotches and spots form a wide zone or cap at the larger end. The secondary, or sub-surface marks are of lavender grey or pale purple, and in the shape of irregular spots and blotches, almost concealed by the surface markings.

Taking these eggs as a series, they are decidedly more boldly marked than are those of any of the other birds of the genus except the Indian Button Quail. In both of these birds clutches of eggs are not uncommon in which the whole of the surface is densely marked with comparatively large blotches of deep velvety black, giving them an unusually handsome appearance. In Karwar this seems to be the normal type of egg, and most of my clutches received from Western India from Messrs. J. Davidson, T. R. Bell, and other collectors, have been of this type. In Bengal and Behar

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the two types are about equal, whilst in Eastern Bengal the freckled form is that most often seen.

The shape, texture and surface of these eggs differ in no way from those of the Black-breasted Bustard Quail, though the size differs to the extent one would have expected. I have now the measurements of 42 eggs, and these run in length from $\cdot 78''$ ($= 19.8$ mm.) to $\cdot 89''$ ($= 22.6$ mm.), and in breadth from $\cdot 63''$ ($= 16.0$ mm.) to $\cdot 70''$ ($= 17.8$ mm.), the average being $\cdot 84''$ ($= 21.8$ mm.) \times $\cdot 66''$ full ($= 16.7$ mm.).

Habits.—This little Hemipode has much the same habits, and frequents much the same kind of cover as the Common or Black-breasted Bustard Quail. It may be found in any sort of jungle, except dense evergreen forest, and even into these it wanders a little way from the wider open cultivation or grass lands. It likes bamboo jungle, especially that which is composed of small clump bamboo, which affords it excellent shelter with but little undergrowth. It is found in gardens, orchards, patches of sun grass, near tanks and ponds, and in the half-trodden down scrub jungle, which surrounds so many villages in Eastern Bengal. It may also be flushed occasionally from any kind of crop, such as hill rice, millet, wheat, or even from various Dahls, standing as high as six feet, or from young sugarcane, jute, etc. Undoubtedly, however, its favourite haunts are fairly wide stretches of sun grass, not necessarily either very long or very dense, for the little bird seems to enjoy places where it can run about with ease and freedom.

It is an inveterate little skulker, and a wonderful runner, so that it is an even harder bird to flush than its bigger relative *Turnix pugnax*. So hard is it to seduce to rise, that I have shot over wide stretches of grass for Florican and other game without seeing a single bird, though we had close lines of beaters working through with us; yet, on setting alight this same grass, the fire has forced a dozen or more of these birds to leave its shelter.

They love basking in the sun in tiny open spaces in the grass, and I have more than once come across them in some small hollow scratched in the dust or sand, in the middle of the patch, lying in luxurious ease half on their sides, with uppermost wing and leg stretched out, and eyes blinking in self-satisfied enjoyment, until they rest on the intruder, and then in a second they are off with a whirr in a headlong flight. But their flight only lasts for a few yards, and they then pitch suddenly into the grass, or cover, not to get up again, however closely one may search. I once came across a little family party thus sunning themselves in the middle of a jungle path. I was wearing rubber shoes, and had approached with complete silence, so that it was not until I had watched them for some moments that they spotted me and flew off. The young were tiny things, not half grown, but they flew as fast as the old bird, all

pitching within a few yards of where he did, and, presently, I heard the faint "cluck-cluck" of the anxious parent as he called to his chicks who, doubtless, ran to him at once, for the clucking soon stopped.

The young seem to hatch in ten to twelve days; the Cacharies say ten days, but judging from what Dr. Seth Smith says of its nearest relations, it is probably twelve. In a very short time they become wonderfully independent, and when less than a fortnight old, can fly short distances with ease and celerity, their wings looking disproportionately large in comparison to their body.

Like *T. pugnax* they eat both insects and seeds, and they are also fond of the blades of growing rice, just as it begins to spring up, for more than once I have taken these from their stomachs. Their actions while feeding are ludicrously like those of the Domestic Fowl; they scratch in the soil and bustle about from one likely spot to another, seize an ant or spider with a little run, hop up and catch a grasshopper on the wing, or turn over the soil and pebbles in search of the insects which harbour beneath them. At the same time their actions impress one as being very secretive, and they have a rather furtive look as they run about, all their energy never disturbing the complete silence.

(To be continued.)

SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

BY OLDFIELD THOMAS, F.R.S.

No. IX.

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A NEW PIPISTRELLE BAT FROM TENASSERIM.

Among the specimens recently obtained for the Mammal Survey of the Bombay Natural History Society by Mr. Shortridge in Tenasserim, there occurs a single specimen of the following striking species of *Pipistrelle*:—

PIPISTRELLUS LOPHURUS, sp. n.

A rather large species with a tuft of glandular hairs on the base of the tail.

Size above the average of the species of this genus. Fur of medium length, hairs of back about 5 mm. General colour, above warm bistre-brown, below rather paler than "Prout's brown," the hairs both above and below blackish-brown at their bases.

Fur not extending on to the wings above, and below only on the part close to the body. On the base of the interfemoral above, however, there is a large glandular patch of hairs, more than half an inch in diameter, the hairs radiating from a point close to the base of the tail, where there is presumably some sort of gland; the hairs themselves are about 5-6 mm. in length, uniformly brown, and more or less unctuous or sticky. On the undersurface no trace of the glandular structure is observable, the usual small triangular area at the base of the tail covered with normal hairs. Ears of medium size, their anterior base convex, roughened, and with a distinct fringe of hair; outer margin with a well-marked basal lobe. Tragus shaped as in *P. imbricatus* and its allies, broad, its greatest breadth opposite the middle of its inner margin; inner margin concave, outer strongly convex, with a large triangular basal lobe. Wings to the base of the toes. A narrow post-calcarial lobule. Tip of tail alone projecting from membrane. Penis skinned in the type, so that it is doubtful whether it has a bone or not.

Skull stout and heavily built, high, not flattened, nasal notch very broad. Anterior palatine notch especially broad, broadening out behind with a straight posterior margin. Posterior palate extended far back, its hinder margin practically entire, with scarcely a trace of a median projection. Basal pits about as in *P. imbricatus*.

Incisors subequal, the inner with a secondary subterminal cusp, the outer concave and with outer and inner marginal secondary cusps; in fact, all very much as in *P. imbricatus*. Small premolar rather large, twice as large as in *imbricatus*. Posterior

premolar with unusually large inner lobe, which projects inwards practically as far as m^1 . Molars with perceptible hypocones. Lower incisors trifold, slightly overlapping, the series of the two sides meeting at an unusually sharp angle.

Dimensions of the type, the italicized measurements taken in the flesh:—

Forearm 35 mm.

Head and body 56; tail 39; ear 14; third finger, metacarpal 33, first phalanx 13; fifth finger, metacarpal 31, first phalanx 8; lower leg and hindfoot (c. u.) 21.7.

Skull, greatest length 14.1, basi-sinual length 10.1, zygomatic breadth 9, interorbital breadth 3.7, palato-sinual length 5.2, breadth of palatal emargination 2.3, mastoid breadth 7.8, height of brain case from basion 5.4, front of canine to back of m^3 3.3, front of p^1 to back of m^2 3.2.

Hab.—Maliwun, Victoria Province, S. Tenasserim.

Type.—Adult male. B. M. No. 14. 12. 1. 6. Original number 4762. Collected 5th February 1914 by G. C. Shortridge. Presented to the National Museum by the Bombay Natural History Society.

This well-marked species is probably most nearly related to *P. imbricatus* and its allies, but is at once distinguished by its unique glandular caudal tuft, its broader skull and its wider palatal emargination.

A NEW MURINE GENUS AND SPECIES FROM CEYLON.

Among the collections made in Ceylon by Major E. W. Mayor for the Mammal Survey are seventeen specimens of a small rat which proves to be not only a new species but to represent a special annectant genus, with some of the characters of *Mus* and *Leggadilla* on the one hand, and of the *Epimys* series of genera on the other. It may be called

CÆLOMYS*, g. n.

Molars in proportions as in *Mus*, in structure as in *Epimys*. No incisive notch or frontal ridges.

Skull on the whole like that of a small delicately built *Epimys*. Face lengthened, brain case of medium size. Supraorbital edges square, without raised ridges. Front of zygomatic plate evenly convex, a well-marked masseteric knob present near its anterior base, as in *Mus*. Palatal foramina rather short, about as in average *Epimys*, not or barely reaching the level of the front edge of the molar alveoli. Back of palate level with the posterior margin of the alveolus of m^3 . Mesopterygoid fossa parallel-sided, neither

* The combination of the strictly classical origin and appearance of this name with its suggestion of the English pronunciation of Ceylon is too attractive to be resisted, even if any pretence of special applicability is a hollow mockery.

broadened anteriorly nor specially narrowed or roofed in. Bullæ of medium size.

Incisors simple, without trace of the notch on the working edge characteristic of *Mus* and *Leggadilla*. Upper molars in their respective proportions as in *Mus*, m^1 being decidedly longer than m^2 and m^3 combined. But in structure they more resemble those of *Epimys*, both in general appearance and the fact that the inner tubercle of the first lamina is but little displaced backwards. Antero-external secondary tubercle on m^2 extremely minute, practically absent and entirely absent on m^3 .

External characters not peculiar. Fur fine, liberally mixed with spines. Ears of average size. Hindfoot with the fifth toe reaching nearly to the middle of the basal phalanx of the fourth; surface of sole between pads granulated, behind them smooth; sole with six distinct elevated pads, the last slightly longer than broad. Mammæ probably 3—2=10 (there are certainly three, and only three, pectoral pairs, and as both *Mus* and *Leggadilla*, with either three or four pectoral, have two inguinal pairs, the great probability is that *Cœlomys* has the same number, but they cannot be made out on the specimens available).

Genotype: *CŒLOMYS MAYORI*, sp. n.

This genus is of a remarkably central and annectant character, having nothing in any way special about it, but merely a mixture of the characters of the other genera, of the group. It is impossible on the one hand to put the species into any one of the older genera, and on the other to name any single character peculiar to it. Even its molars show this mixture, having the relative proportions of those of *Mus*, while the structure is more as in *Epimys*.

To show its position we may take Wroughton and Ryley's synopsis of the Indian genera of Muridæ†, and, commencing next below *Apodemus*, alter it as follows:—

- b^3 Postero-internal cusp of upper molars absent.
- a^4 . M^1 longer than m^2 and m^3 combined.
- a^5 . Bevelled edge of incisors notched.
- Palatal foramina penetrating deeply between the molars.
- a^6 . Frontal ridges well marked ... *Leggadilla*.
- b^6 . No frontal ridges *Mus*.
- b^5 . Bevelled edge of incisors not notched.
- Palatal foramina shorter. No frontal ridges *Cœlomys*.
- b^4 . M^1 equal to or shorter than m^2 and m^3 combined. Incisor edges not notched. Frontal ridges present.
- a^5 . Front edge &c.

† Journ. Bom. N. H. Soc. 1913, p. 20.

CÆLOMYS MAYORI, sp. n.

Size about as in some of the smaller "Rats," such as *Epinomys concolor*, larger than in any member of *Mus* or *Leggadilla*. Fur rather long (about 10 mm. on the back), fine, profusely mixed with spines, the latter not very stiff, about $\frac{1}{3}$ - $\frac{1}{4}$ mm. in breadth. Colour of upper surface uniform mummy brown, hairs tipped with buffy, the spines greyish white tipped with black. Under surface soiled greyish or brownish, the hairs slaty with brown or greyish tips. Face rather darker. Ears of medium length, practically naked, grey. Hands brown to the metacarpals or basal phalanges, the terminal phalanges abruptly and prominently white; feet wholly dark brown above, or the extreme tips of the toes white. Tail ranging from rather shorter to rather longer than head and body, finely scaled (15-16 rings to the centimeter), short-haired, not pencilled, dark brown above, white below, the contrast not very sharply defined.

Dimensions of the type, measured in the flesh:—

Head and body 98 mm.; tail 102; hind foot 26 (range from 22.5); ear 17. Skull, greatest length 30; condylo-incisive length 27.5 (range from 25); zygomatic breadth 14; nasals 12.7; interorbital breadth 5; breadth of brain case 12.5; palatilar length 13; palatal foramina 5.7; upper molar series 4.4.

Hab.—Pattipola, highlands of Central Province, Ceylon, Alt. 6210.'

Type.—Old male B. M. No. 14, 12, 1, 7. Original No. 1038. Collected 25th March 1914 by Major E. W. Mayor. Presented to the National Museum by the Bombay Natural History Society. Seventeen specimens, all from the same locality.

"Trapped on the summit level, in jungle"—E. W. M.

Major Mayor is to be congratulated on his discovery of so striking an addition to the mammal fauna of Ceylon, and I have much pleasure in connecting his name with it. It is probably a very local animal, as he did not meet with it elsewhere than at Pattipola.

NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.)

BY

LT.-COL. H. H. HARRINGTON, Indian Army.

Part III.

Family—TIMELIIDÆ.

"Sexes alike; solitary or occurring in very small troops; not noisy; legs and feet strong; wings short and rounded; habits, skulking in bushes or on the ground; evading observation; colour of eggs, with few exceptions, spotted." (Oates).

The above is the only definition I can find which attempts to define what should constitute membership of the *Timeliidæ*, but it does not cover all the numerous genera, which at present go to make up this very mixed assembly of small birds. Many of these have nothing in common, except that they are non-migratory and consequently have short rounded wings. ¶¶

However Mr. Oates's definition is very good as far as it goes, and covers a great number of genera which are thoroughly *Timeliine* both in structure and in habits. Others on the other hand, are just the reverse in habits, being gregarious, by no means shy or retiring, and instead of haunting the ground, frequent trees and bushes. Unfortunately these characteristics are not sufficient to divide the family, as we find nearly allied species in the same genera differing greatly in habits, some being essentially *Timeliine* whilst others are the reverse. This being the case in the *Alcippe*, which contains birds very similar in structure, colouration, and nidification, but differing remarkably in habits.

As many of these genera appear to grade into each other and to be nearly related, I have attempted to group them together. By so doing, I do not wish to imply that birds so grouped should belong to the same genus, but to try and show that a relationship appears to exist, and thereby possibly forming sub-families.

In some of these groups the relationship is well marked, the grading of one genus into another most noticeable. In others this is not so apparent, and I am probably wrong in grouping some together. I hope, any mistakes I have made in my attempt to sort out the "Ornithological Waste-paper Basket" may be pointed out.

Besides my attempt at Grouping, I have made out a "Key" based on that of Mr. Oates in the Fauna.

Note.—I think something should be done to give suitable English names to the numerous small "Babblers" which are included in this very large family.

KEY.

- A.—Wing, short, rounded, and fitting close to the body; tarsus long and strong.
- a. Tail much longer than the wing.
- a¹. Shafts of the feathers of the crown soft, (*i.e.*, not separable from the web).
- a². Wing about $3\frac{1}{2}$ times length of tarsus, bill notched *Campsorhynchus*.
- b². Wing about $2\frac{1}{2}$ times length of tarsus, bill not notched *Pycetorhis*.
- b¹. Shafts of the feathers of the crown, rigid and glistening.
- c². Bill stout and black *Timeliia*.
- d². Bill more slender, and pale coloured *Dumetia*.
- b. Tail, equal to, or slightly shorter than, the wing.
- c¹. Shafts of the feathers of the forehead soft.
- c². Tail greatly graduated, the outer pair of tail feathers falling short of the middle pair by more than one inch. (Bill slender and very straight) *Elaphornis*.
- f². Tail not greatly graduated, the outer pair of tail feathers falling short by less than one inch.
- a³. Bill stout and straight, rather deeper at the genys (middle) than at the nostrils.
- a⁴. Nostrils long, and protected by an overhanging membrane.
- a⁵. Rictal bristles very short; nostrils not overhung with hairs.
- a⁶. Wing and tail about equal; underplumage streaked *Pellorneum*.
- b⁶. Tail shorter than the wing; underplumage not streaked.. *Scotocichla*.
- b⁵. Rictal bristles well developed; nostrils overhung with hairs *Drymocataphus*.
- c⁵. Rictal bristles very long and strong; no hairs overhanging nostrils *Gypsophila*.
- b⁴. Nostrils, small, oval, exposed, and pierced in the anterior corner of the membrane *Malacocincla*.
(*Turdinus*.)
- b³. Bill stout, culmen gently curved throughout to the tip; bill deepest at the nostrils.
- c⁴. Outer edge of the primaries uniform.
- d⁵. Nostrils long, and overhung by a membrane.
- c⁶. Small bristles overhanging the nostrils; tail less graduated, outer tail feather less than $\frac{1}{2}$ an inch shorter than middle pair *Alcippe*.

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- d*^o. Nostrils not overhung with bristles; outer feather more than $\frac{1}{2}$ inch shorter than middle pair *Schoeniparus*.
e^o. Nostrils, oval, exposed, pierced in the anterior corner of the membrane *Rhopocichla*.
*d*¹. Outer edge of the primaries conspicuously particoloured.
*f*¹. Nostrils not overhung by hairs.
*e*². Tail scarcely graduated. (Tail shorter than the wing.) .. *Pseudominla*.
*f*². The two outer pair of tail feather only graduated *Siva*.
*g*¹. Nostrils overhung with numerous small hairs. (Tail strongly graduated.)
*g*². Bill narrow; hind-claw as long as hind-toe *Proparus*.
*h*². Bill broad; hind-claw not long as hind-toe *Lioparus*.
*c*¹. Bill conical and sharply pointed, culmen straight. (Nostrils covered by a membrane.) *Stachyrhidopsis*.
*d*¹. Feathers of the forehead stiff shafted.
*g*². Space round the eye not naked.
*d*³. A conspicuous scale overhanging the nostril *Stachyrhis* and *Thringorhina*.
*f*³. Nostrils, oval, exposed, pierced in the anterior portion of the membrane .. *Mivornis*.
*h*². Space round the naked *Cyanoderma*.
c. Tail very much shorter than the wing. (Upper plumage squamated.)
*e*¹. Bill moderate and straight *Turdinulus* and *Corythocichla*.
*f*¹. Bill long and curved *Rimator*.
B.—Wing, long, not rounded, nor fitting close to the body.
d. Wing more than 3 times length of tarsus .. *Setaria*.
(Malacopterum.)
e. Wing less than 3 times length of tarsus.
*g*¹. Tail more than twice tarsus *Erythrochichla*.
*h*¹. Tail equal to twice tarsus *Aethostoma*.
(Trichostoma.)

GROUP I.

GAMPSORHYNCHUS.

This group consists of only one species and its geographical races; and is a most unsatisfactory one to have in the *Timeliidae*, both on account of its size and structure. The colour of its eggs at once precludes it being placed in the *Crateropodidae*, and as Mr. Oates says "Pending a better acquaintance, their position at present appears to be in the *Timeliinae*."

It has the following characteristics, tail much longer than the wing and greatly graduated; a powerful hooked bill, and is chiefly noticeable for the adult having a considerable amount of white on the head, which it appears to require two years to assume.

GROUP II.

PYCTORHIS.

This consists of two well-marked species, and their sub-species, which appear to form connecting links with the *Paradoxornithide*.

They also have a tail much longer than the wings; and a short deep bill with no notch at the tip.

One species (*P. sinensis*) consists of birds inhabiting the open country, and having a flight rather reminding one of a "Butcher-bird;" the other (*P. altirostris*) are birds only found in high grass along river banks. The eggs of the former are well known, and are some of our most beautiful Indian eggs, those of the latter, I believe, have not yet been described.

GROUP III.

ELAPHRORNIS.

This group consists of one species, peculiar to the Island of Ceylon, which in my opinion is undoubtedly a Warbler, showing some affinities to the African *Cisticola*; and has only been temporarily included in my list.

It has the wing and tail about equal in length, the latter being greatly graduated; a slender longish bill, and the plumage very soft and dense.

GROUP IV.

TIMELIHA.

In this I have placed *Timeliha* which consists of one species and its geographical races, and *Dumetia*, the last being peculiar to the Peninsula of India, and consists of three sub-species.

The characteristics of this group are, tail much longer than the wing, and greatly graduated; the shafts of the feathers of the crown rigid. In *Timeliha* the bill is very stout and massive, and intensely black; whilst *Dumetia*, has a more slender bill, which is pale in colour. Both species build dome-shaped nests, which are placed near the ground, and their eggs are white covered with numerous spots.

GROUP V.

PELLORNEUM.

I have grouped the following together, *Pellorneum*, *Scotocichla*, *Drymocataphus*, and *Rhopocichla*, they are all thoroughly Timeline in habits; differing from the last group, in having a shorter tail; and the shafts of the feathers of the crown soft. The type of eggs of this group, with one exception, are very like those of the last, in *Drymocataphus* the eggs are of a totally different type, being either a very bright pinkish-red, or dark greenish with dark brown spots.

GROUP VI.

GYPSOPHILA.

This group also contains only one species, the habits and nidification of which nothing appears to be known. Its chief peculiarity is, as in *Gampsorhynchus* and *Acanthoptila*, that the adult has a considerable amount of white on the head, otherwise in structure it appears to be allied to the *Pellorneum* group.

GROUP VII.

MALACOCINCLA (Turdinus).

This is only represented by one genus within Indian limits, others are found in the Malay Peninsula and Islands. It is thoroughly Timeline in appearance and habits, and is characterised by its short tail and oval and exposed nostrils. The eggs of our only Indian species are very handsome and approach in colour some of the *Alcippe*.



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GROUP VIII.]

ALCIPPE.

This is rather a large group, the members of one genus grading into those of the next; in habits, they range from those which are thoroughly Timeline, (*Schaniiparus*), up to the *Sivas*, which are arboreal in habits. In it I have placed the following, *Schaniiparus*, *Alcippe*, *Pseudominla*, *Proparus*, *Siva* and *Lioparus*. I have been unable to find any definite characteristics of this group, the wing and tail are about equal, that is one not conspicuously shorter than the other, and the bill, small and slightly curved. The majority build cup-shaped nests and lay highly coloured eggs.

GROUP IX.

STACHYRHIS.

In this group I have placed *Thingorhina*, [*Stachyrhis*, *Stachyrhidopsis*, *Micornis*, and *Cyanoderma*. Members of the first three genera grades vary naturally from one into the other, this is most noticeable in the bill, which ranges from rather a coarse notched one in *Thingorhina*, to a slender pointed one in *Stachyrhidopsis*. The last two differ from the first in the shape and formation of their bills, but show a remarkable resemblance in their colouration and style of plumage. In habits they are not Timeline but given to haunting trees; in nidification the first two are peculiar in being the only two genera in the *Timeliinae* which lay spotless white eggs, the other members of this group all lay white eggs spotted with reddish.

GROUP X.

TURDINULUS.

This is a very compact group consisting of the three Wren-like genera, *Turdinulus*, *Corythocichla*, and *Rimator*, the last being remarkable for its extremely long bill. The members of this group are characterised by their short tails and squamated upper plumage. In habits they appear to be very Wren-like (*Troglodytes*), haunting hillsides and brushwood, and being solitary. They all build dome-shaped nests which are placed on or near the ground, and lay white eggs profusely spotted with reddish-brown.

GROUP XI.

SETARIA.

I have placed *Setaria* (*Malacopteron*), *Erythrochichla* and *Æthostoma* (*Trichostoma*) in this group, they are hardly Indian and belong really to the Malayan Fauna, only coming within our limits in the extreme south of Tenasserim. Very little has been recorded, about their habits and nidification, which might help us to their classification, and from their long wings and short tarsi, I think, should be removed from amongst the *Timeliinae*.

They have the following characteristics, a fairly long wing, which does not fit close to the body; tail equal to or shorter than the wing, a short tarsus; bill stout, straight and very strong; rictal bristles extremely long; habits strictly arboreal.

GROUP I.

GAMPSORHYNCHUS, Blyth, 1844.

Oates, F. B. I., i., p. 134.

This group consists of one species which is confined to the eastern portion of the Empire and the Malay Peninsula, and has been divided up into three sub-species.

Their characteristics are a long graduated tail; short rounded wings, the first four primaries graduated; a powerful shrike-like bill; and their rictal bristles well developed. General colour rufous-brown with white heads and breasts; the young appear to take two years to assume the white and to breed in the immature stage.

From their structure they seem to approach the "Laughing-Thrushes" but differ from them in the colour of their eggs, which Mr. Stuart Baker has shown in one sub-species are spotted. They differ from all other Timeliids, with exception of *Gypsophila*, and *Acanthoptila*, in the young being differently coloured, and in almost the same particulars as in those two genera.

It would help immensely if specimens of this genus were sent home in spirits, so that they could be anatomically examined, and their true position determined.

GAMPSORHYNCHUS RUFULUS RUFULUS, Blyth.*

The White-headed Shrike Babbler.

Gampsorhynchus rufulus, Blyth, J. A. S. B., xiii., p. 371, 1844; Sharpe, Cat., B. M., vii., p. 386; Oates, F. B. I., p. 135; Baker, Ibis, 1895, p. 53; *ibid* Ibis, 1906, p. 96; *ibid*, J. B. M. H. S., viii., p. 179.

Description.—As in Oates, F. B. I.

Distribution.—The lower ranges and valleys of Sikhim, Sadiya and Tippook in Assam; the Daphla Hills, and Garo Hills; Arracan. (Oates). I procured two specimens at the Jade Mines in the Myitkyina District of Upper Burma, these are now in the Society Museum.

Habits and Nestings.—Mr. Stuart Baker is, I believe, the only one who has recorded anything about the nidification of this interesting species. In habits, they appear to go about in parties like Laughing-Thrushes. Their nests seem to be very untidy, cup-shaped affairs of a shrike-like appearance which are placed in bushes and saplings. The eggs "have a ground colour of very pale-yellow stone and the superior markings consist of freckles, specks, and tiny blotches of reddish-brown; these are scattered fairly numerously all over the egg, but more thickly towards the larger end, wherein two eggs they form a pretty distinct ring, and in a third an indistinct cup. The secondary markings are of the same character and distribution, but pale lavender and purple grey in colour and measured .91" × .67." †

GAMPSORHYNCHUS RUFULUS TORQUATUS, Hume.

The Ring-necked Shrike Babbler.

Gampsorhynchus torquatus, Hume, Proc. A. S. B., 1874, p. 107; Sharpe, Cat., B. M., vii., p. 387; Oates, F. B. I., i., p. 136.

Description.—As in Oates, F. B. I.

Nothing is known about the habits or nidification of this species.

Distribution.—Toungoo Hills, Karennee, and Tenasserim.

GROUP II.

PYCTORHIS, Hodgson, 1844.

This genus at present only contains two species and their geographical races, and is practically confined to the Indian Empire and Ceylon, one species *P. sinensis* extending into Yunnan and Siam.

They have the following characteristics: a small rounded wing, and long graduated tail; a short deep bill without any notch; oval and exposed nostrils and weak rectal bristles.

NOTE.

Pyctorhis gracilis, Styan, Ibis, 99, p. 295. Is only a synonym of *Moupinia pacilotis* (Verr.), which I think should be included in this genus.

*GAMPSORHYNCHUS RUFULUS SATURITIAR, Sharpe.

The Malay Shrike-Babbler.

Sharpe, P. Z. S., 1888, p. 273.

Habitat.—Perak, Malay Peninsula.

† The nest of *G. rufulus* is not unlike the Shrikes of the *Voloc ivora* group, but the eggs are quite different in character, very like, in fact, *Drymocapthus tickelli* in the *Timeliinae* and *Copsychus* amongst the *Merulidae*.—E. C. S. B.]

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KEY.

- A.—Bill black; forehead plain rufous.
a. Nostrils yellow *P. s. sinensis.*
b. Nostrils black *P. s. nasalis.*
- B.—Bill yellowish-brown; forehead blackish with grey margins.
c. Upper plumage reddish-brown.
a' Chin, throat and upper breast whitish .. *P. a. altirostris.*
b' Chin, throat and upper breast grey .. *P. a. griseigularis.*
d. Upper plumage earthy brown, chin and throat
only white *P. a. scindicus* sub-sp.
nov.

PYCTORHIS SINENSIS SINENSIS, Gm.

The Indian Yellow-eyed Babbler.

Parus sinensis. Gm., Syst. Nat., i., p. 1012 (1788).

Pyctorhis sinensis. Sharpe, Cat., B. M., vii., p. 510; Oates, F. B. I., i., p. 117

Description.—As in Oates, F. B. I.

Note.—Birds from dry localities and the plains are much paler than hill specimens, some of which are very dark and richly coloured.

Distribution.—Every portion of the Indian Empire, except south of Moulmein; it extends into Yunnan and Siam.

PYCTORHIS SINENSIS NASALIS, Legge.

The Ceylon Yellow-eyed Babbler.

Pyctorhis nasalis, Legge, A. M. N. H. (5), iii., p. 169 (1879); Sharpe, Cat., B. M., vii., p. 512; Oates, F. B. I., i., p. 138.

Description.—As in Oates, F. B. I.

Distribution.—Confined to the Island of Ceylon.

KEY to Sub-species of *P. altirostris*.

—	<i>P. a. altirostris.</i>	<i>P. a. griseigularis.</i>	<i>P. a. scindicus.</i>
<i>Type locality</i> ..	Thyetmyo, Burma.	Assam	Sukkur, Sind.
<i>Distribution</i> ..	The Plains of Lower Burma.	The Plains of Assam and Upper Burma.	(Probably the Indus basin).
<i>Chin and Throat..</i>	Whitish ..	Ashy grey ..	Whitish.
<i>Upper breast</i> ..	Whitish ..	Ashy grey ..	Pale ochraceous.
<i>Lower breast, flanks and abdomen.</i>	Pale-fulvous ..	Rufous	Pale ochraceous.
<i>Upper plumage..</i>	Reddish-brown, darkest on the wings and tail.	Reddish-brown, darkest on the head	Fulvous; reddish-brown on the wings and tail. Head the same colour as the back.

Note.—I can find nothing recorded as to the habits or nidification of any of the above sub-species. Their distribution is also very imperfectly known, and as they inhabit dense high grass most probably have often been overlooked; their distribution is therefore most probably much wider.

PYCTORHIS ALTIROSTRIS ALTIROSTRIS, Jerdon.

*Jerdon's Babbler.**Chrysomma altirostre*, Jerdon, Ibis, 1862, p. 22.*Pyctorhis altirostris*, Sharpe, Cat., B. H., vii., p. 512; Oates, F. B. I., i., p. 139.

Description.—"Forehead and a broad stripe to the eye hoary-grey with black centres; lores grey; sides of the head and neck greyish-brown, tinged with rufous, more hoary round the eye; whole upper plumage deep reddish-brown, darkest on the wings and tail; chin, throat, cheeks, and upper breast whitish; lower breast, flanks and abdomen ochraceous." "Upper mandible pale horn-colour, lower pinkish flesh-colour; iris hazel-brown; eyelid and orbital skin greenish-yellow; legs and feet pinkish-brown." "Length, about 6.5"; tail, 3.3"; wing, 2.4"; tarsus, .9"; bill from gape, .55" (Oates).

Wing, 57-61 mm. Average six specimens, 60 mm.

Distribution.—Thayetmyo and the plains of Pegu, in Lower Burma.*Habits*.—Nothing is known about the habits or nidification of this species, it is only found in long elephant^{or} kine grass.

PYCTORHIS ALTIROSTRIS GRISEIGULARIS, Hume.

*Hume's Babbler.**Pyctorhis griseigularis*, Hume, St. Frs., v., p. 116. (1877); Harington, Bull. B. O. C., xxxiii., p. 47.

Description.—Similar to *P. a. altirostris*, Jerdon, differs, in having chin, throat, and upper breast, grey, instead of white; the lower breast, abdomen and flanks, dull rufous, instead of pale-fulvous.

Wing, 62-64. mm. Average of seven specimens, 63. mm.

"Bill pale horny, nearly white towards base of lower mandible; legs pale fleshy or orange-brown; feet darker." (Hume.)

Distribution.—Assam, and the Butan Doars.

Four specimens procured by me at Bhamo Upper Burma, in February and June, and now in the Tring Museum, are very similar to the above, in having the abdomen dull rufous and breast grey; but have the throat white instead of grey, and therefore appear to form a connecting link between the Assam and Pegu birds. I found these birds very common in the dense "Kine-grass" around Bhamo, it is probably to be found inhabiting similar localities throughout Northern Burma.

PYCTORHIS ALTIROSTRIS SCINDICUS, Sub-sp. nov.

The Sind Babbler.

Sharpe, Cat., B. M., vii., p. 513.

It is not always advisable to describe a new species from a single specimen, but as the only one, I have been able to examine from Sind, differs entirely from *P. a. griseigularis*, Hume, from Assam its nearest geographically, I think it advisable to give it a name. Dr. Sharpe, in the "Catalogue of Birds," notices the difference between the Sind bird and *P. altirostris*.

Description.—Similar to *P. a. altirostris*, Jerdon, from Pegu, differs in having its upper plumage fulvous, instead of reddish-brown; its chin and throat white, breast and remainder of lower plumage ochraceous.

Wing, 65. mm.; culmen, 12 mm.; bill from gape, 13. mm.

Type.—In the British Museum.*Habitat*.—Sukkar in Sind.

GROUP III.

ELAPHORNIS, Legge, 1879.

This genus contains one species which is confined to the mountains of Ceylon. Nothing appears to be known about it and to what family or group it should belong. Mr. Oates placed it amongst the *Brachypterygineæ*, but for

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what reasons he does not state. To me it appears to be more nearly allied to some of the warblers, and until it has been anatomically examined and its true position determined, afraid it must still remain amongst the miscellaneous list of *Timeliidae*.

It has the following characteristics: a long delicate black bill equalling the hind-toe and claw in length, and perfectly straight; rectal bristles weak; no hairs overhanging the nostrils; the nostrils long narrow slits, not covered by a membrane; a rounded wing, the first four primaries graduated; wing and tail equal, the latter also very much graduated; under plumage not streaked; the whole plumage is very soft and approaching the *Luscinola* in texture, in fact the bird looks much more a warbler than a babbler. There is also reason to believe that the young, and possibly the sexes vary, a very non-Timeline feature.

It is hoped that members in Ceylon will collect a series of this bird and also a few specimens in spirit.

ELAPHORORNIS PALLISERI, Blyth.

Palliser's Warbler.

Brachypteryx palliseri, Blyth, T. A. S. B., xx., p. 178 (1851).

Elaphornis palliseri, Sharpe, Cat., B. M., vii., p. 517; Oates, F. B. I., 1 p. 191; Hale, Bull. B. O. C., xxxiii., p. 91.

Description.—As in Oates, Fauna, B. 1.

Distribution.—Ceylon.

Until recently nothing seems to have been known about the nidification of this interesting species, which appears to be allied to some African warblers. Mr. T. P. Aldworth was lucky enough to procure a nest with parent bird, and has given me the following note. The eggs are most remarkable, and are intermediate between those of *Tribura* and the pale type of Bulbul. In fact Mr. Stuart Baker has received eggs from Ceylon reputed to be of this species, but owing to their similarity to Bulbul's eggs, hesitated to accept them as authentic, but now thanks to Mr. Aldworth's eggs, which agree with those received by Mr. Stuart Baker, all doubt has been removed. I may add Mr. Stuart Baker has generously given me a pair of these interesting eggs.

Note by Mr. T. P. Aldworth.

"*Elaphornis palliseri*, Pallisers' Warbler: found the nest of this bird on 10th April 1911 while it was being built, in a small shrub of the laurel family?, at about 3 feet from the ground, situated in a small open patch, in the dense jungle on the bank of a stream flowing from the Horton Plains to the Boga-want-alawa valley. The nest which was composed of coarse grass-stalks, moss, and fine twigs, lined with skeleton leaves and grass fibres, was deeply cupped and fairly solid. It was completed on about the 23rd. I took the two eggs on the 23th, as though I visited the nest on several occasions, I failed to see any sign of the bird until she had commenced to sit. From the construction of the nest, I was rather surprised to only get two eggs, but have since seen two more clutches, belonging to Mr. Stuart Baker, both of two eggs, so conclude this is the probable normal amount, moreover, there seems to be little variation among them, as the eggs in each of these sets were almost identical; of a pinkish-white ground colour, thickly freckled with purplish-brown, with mauve or grey under markings, and one or two hair like lines at the larger end."

GROUP IV.

TIMELIA, DUMETIA.

This group consists of *Timelia* and *Dumetia*. Their characteristics are: tail much longer than the wing, and greatly graduated; the shafts of the feathers of the crown rigid and glistening.

TIMELIA,* Horsfield, 1821.

Sharpe, Cat., B. M., vii., p. 507; Oates, F. B. L., i., p. 131; Hartert, Nov. Zool., viii., p. 53.

This genus consists of only one species, and at present represented by three geographical races, which extend from Nepal along the Himalayas into Assam, Burma, S. China, the Malay Peninsula, and Java.

It holds the proud position of having given its name to what has been most aptly termed the "Ornithological Waste-paper Basket," for into this so-called family numerous genera have been cast, presumably because they have been refused admission to other better known ones.

They have the following characteristics: a short rounded wing, fitting close to the body; tail much longer than the wing, and greatly graduated; the feathers of the forehead stiff, with glistening shafts; bill coarse and intensely black.

KEY.

—	<i>T. p. pileata.</i>	<i>T. p. jerdoni.</i>	<i>T. p. bengalensis.</i>
Locality ..	Java ..	Burma ..	India.
Abdomen ..	Pale buff..	Rusty buff ..	Fulvous, or dull buff.
Flanks ..	Buff tinged with olive.	Dark olive ..	Dark olive, sides of the breast very grey.
Forehead and supercilium.	Very narrow ..	Wider than <i>pileata</i> .	Broader than <i>jerdoni</i> .
Crown ..	Bright chestnut ..	Bright chestnut ..	Darker than the other two.
Upper plumage ..	Pale olive-brown...	Darker than <i>pileata</i> .	Darker than <i>jerdoni</i> .
Tail ..	Pale, not distinctly barred.	Ditto ..	Dark, and distinctly barred.
Wing measurements.	"67 mm. to 73 mm." (Hartert).	Average of— 13 spec. 64 mm. Max. 68 mm. Min. 61 mm.	16 spec. 61 mm. Max. 64 mm. Min. 55 mm.

* TIMELIA PILEATA PILEATA, Horsfield, 1821.

The Java Red-capped Babbler.

Horsfield, Trans. Linn. Soc., xiii., p. 151 (1821); Sharpe, Cat., B. M., vii., p. 507; Hartert, Nov. Zool., viii., p. 53.

Description.—"Java birds have abdomen pale buff; the side of the breast and flanks buffy-olive, the crown rather lighter rufous, the whole back, rump and upper tail-coverts much paler and more buffy; the tail much paler and less distinctly barred." (Hartert.)

"Wing, 67mm. to 73 mm. (or 2'65" to 2'87"); the males being larger than the females."

Habitat.—Java. There are specimens in the British Museum from Siam, Saigon and Molucca, which are, I think, referable to this sub-species.

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TIMELIA PILEATA BENGALENSIS, Godwin-Austin.

The Bengal Red-capped Babbler.

Timelia bengalensis, Godwin-Austin, J. A. S. B., xli., part 2, p. 143 (1872); Hartert, Nov. Zool., viii., p. 53; Oates, N. & Eggs, i., p. 91.

Timelia pileata, Oates, F. B. I. p. 132 (part).

Description.—"The form from the Himalayas and Assam is considerably smaller, much darker above, the tail much darker and more distinctly barred. The abdomen is of a dirty buff, the sides of the breast and flanks are deep brownish-olive. This colour extends much further towards the middle of the breast and abdomen, so that the pale area is much more restricted." (Hartert.)

"Wing 59 to 61 mm. (2.3" to 2.4")."

Distribution.—Along the lower hills, from Nepal to Sikkim, Bengal, Bhutan and Assam.

Habits.—Haunts damp low-lying localities. Placing its nest on or near the ground; this is composed of grass and leaves, untidily put together into a loose ball; the breeding season is from April onwards. The eggs are white profusely spotted with brown, and measure from .69" to .75" by .55" to .6".

TIMELIA PILEATA JERDONI, Walden.

The Burmese Red-capped Babbler.

Timelia jerdoni, Walden, A. M. N. H. (4), x., p. 61 (1872); Hartert, Nov. Zool., viii., p. 53; Oates, N. & Eggs, i., p. 91.

Timelia pileata, Oates, F. B. I., p. 132 (part).

Description.—"Specimens from Tenasserim are intermediate between those from Java and Northern India, they have the abdomen much more rufous, the upper plumage browner, the crown slightly darker, and the sides of the breast and flanks darker and more olive than the Java birds."

"Wing, about 67 mm. (2.65")." (Hartert.)

Distribution.—The whole of Burma in suitable localities. I have only found this species in damp low-lying places in Upper Burma, Oates mentions that it frequents gardens in Lower Burma. Its nest and eggs are the same as the last species.

Note.—Two specimens, now in the British Museum, collected by Lieut. Vaughan, R. N., in S. China, are nearest to *T. p. jerdoni* from Burma, but are slightly smaller, and have the under parts darker, and a much more massive bill for their size.

DUMETIA, Blyth, 1849.

Oates, F. of B. I., i., p. 133.

"This genus, which contains two common Indian species, resembles *Timelia*, very closely in structure, especially in the stiffness of the shafts of the feathers of the forehead and crown. The essential difference between the two genera is that in *Dumetia* the bill is much smaller, more slender and of a pale colour, and in *Timelia* larger, deeper, and black." (Oates.)

Mr. Oates in describing *D. albigularis* points out the differences between birds from the following localities: "From Mt. Abu and Deesa down to Mahableshwar the greater number of birds have nearly the whole crown deep rufous with pale shaft-streaks. In Mysore and the Wynaad the rufous is restricted to the forehead, the feathers having intensely black shafts, and all the feathers of the throat having conspicuously black shafts. Ceylonese birds resemble the Mysore and Wynaad ones, but the throat is without the black shafts so conspicuous in the latter." On examining the large series in the British Museum, I find that the birds from the first

localities are quite distinct from the others, in having the head conspicuously rufous. Birds from Ceylon have the head slightly more rufous than those from Mysore, but I do not find the black shaft stripes mentioned by Mr. Oates constant in birds from Southern India, and therefore do not consider there is sufficient variation to separate the birds from Ceylon from the Southern Indian species.

The geographical distribution, as far as I can determine, of these species is as follows: The southernmost limits of *D. hyperythra* appears to be a line somewhere between Khandala on the west and the Godavary on the east; from here it extends northwards through the Central Provinces, Chota Nagpur, the United Provinces, up to the hills as far west as Simla, and to Darjeeling on the east, wanting in Lower Bengal, but appearing on the Paresnath Hills. *D. albigularis abuensis*, sp. nov., inhabits Rajputana about Mt. Abu and Deesa, down to Mahableshwar, the exact limits at present uncertain. *D. albigularis albigularis*, Southern India from Belgaum, southwards into Mysore and the Wynaad, and to Ceylon.

KEY.

- A.—Chin and throat rufous *D. hyperythra*.
 B.— " " " white.
 a. Forehead only pale rufous *D. albigularis albigularis*.
 b. Whole crown rufous, with pale shaft streaks *D. albigularis abuensis*.

DUMETIA HYPERYTHRA, Franklin.

The Rufous-bellied Babbler.

Timelia hyperythra, Franklin, P. Z. S., 1831, p. 118.

Dumetia hyperythra, Sharpe, Cat., B. M., vii., p. 515; Oates, F. of B. I. i. p. 133.

Description.—As in F. B. I. Birds from the Himalaya foot hills have the plumage darker, and the back with almost a greenish tinge.

DUMETIA ALBIGULARIS ALBIGULARIS, Blyth.*

The Small White-throated Babbler.

Malacocercus? albigularis, Blyth, J. A. S. B., xvi., p. 453 (1847).

Dumetia albigularis, Sharpe, Cat., B. M., vii., p. 514; Oates, F. of B. I., i. p. 134.

Description.—Forehead pale rufous; feathers round the eye white; upper plumage, wings and tail olive-brown; tail faintly cross rayed; chin and throat white, the feathers having glistening white shaft stripes; the remainder of under plumage rusty red.

"Iris, birds from Wynaad white, from Ceylon greyish-olive or white; bill, legs and feet pinkish fleshy; upper mandible along the culmen tinged with brown."

"Length, about 6"; tail, 2.7"; wing, 2.2"; tarsus, .75"; bill from gape, .6" (Oates)."

Distribution.—Southern India [from Belgaum to Mysore and the Wynaad, and to Ceylon. In habits it seems to be a miniature *Argya*, frequenting

* *Ophrydornis Buttkofer*.

Note in the "Hand List of Birds", Sharpe, iv, p. 87.

D. albigularis. Blyth.

This has been entered in error, and refers to *Setaria albigularis*, Blyth, and does not refer to this "*albigularis*."

The same error has been perpetuated in the *Catalogue of Nests and Eggs*, Vol. iv, p. 31.

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scrub jungle and brush-wood, and going about in small parties. Nesting from April to July, building an untidy dome-shaped nest of grass and leaves on or near the ground. And laying from two to four white eggs spotted with bright red, measuring from '66" to '78" by '5" to '55".

DUMETIA ALBIGULARIS ABUENSIS, sp. nov.

The Mt. Abu Babbler.

Description.—Similar to *D. a. albigularis*, Blyth. Differs in having the whole crown chestnut, instead of the forehead only being a pale rufous; and under parts much darker.

"Iris, birds from Deesa, dark brown." (Oates.)

Distribution.—The country round Mt. Abu, Deesa, and down to Mahableshwar I can find nothing recorded about birds from the above localities, but their habits most probably are the same as the last species.

GROUP V.

PELLORNEUM.

This group consists of *Pellorneum*, *Scotocichla*, *Drymocapthus*, and *Rhopocichla*, I am very doubtful about the last, whether it should be in this group at all, as the shape of its bill approaches that of the *Alcippe* type.

They have the following characteristics: feathers of the crown soft shafted; no very great difference between the length of the wings and tail; legs and feet remarkably strong; and short rounded wings, the first four primaries graduated.

N. B.—I think some of the species in this group are at present in the wrong genera.

PELLORNEUM, Swainson, 1831.

Cinclidia, Gould; *Hemipteron*, Hodgson.

Jerdon, ii., p. 27; Oates, F. B. I., i., p. 139.

"Bill moderate straight and compressed, and about three-fourths the length of the head, slightly hooked at the tip, and notched; the nostrils not overhung by hairs, and the rictal bristles are extremely short. The wings and tail are about equal in length; tarsus moderate; feet large; middle toe lengthened; laterals barely unequal; hind toe long; claws tolerably curved." (Oates and Jerdon.)

"Bill slender, nasal opening linear, rictal bristles short not reaching to the nostrils; tail as long as the wing, strongly rounded, about twice and a half the length of the tarsus, this latter strong at least an inch in length; toes long and strong; crown more or less rufous, bordered by a distinct paler eye-brow; lower surface, at least the chest, distinctly striped with brown."—*Buttkofer, Notes, Leyden Museum*, Vol. xvii, p. 75.

This genus has the following characteristics: a short rounded wing; fitting close to the body, the first four primaries graduated; wing and tail about equal; the feathers of the forehead soft; bill long and straight; rictal bristles very short; no hairs overhanging the nostrils; under plumage streaked.

It falls into three sub-groups, the last two are in appearance much nearer to *Drymocapthus*, and I think should be included in that genus.

i. *P. ruficeps*.

Are most noticeable for their rufous-capped heads, and under parts boldly striped with dark brown, giving them a regular "Tit-lark" appearance.

They have rather long bills which are as long as the hind-toe and claw together.

N. B.—I think this genus should be restricted to only this species.

ii. *P. palustre*, Jerdon.

Wants the rufous cap, and has the under parts streaked, but not boldly striped as in the last; the bill is shorter than the hind-toe and claw, the latter being remarkably well developed. They appear to form a connecting link between the last and *Drymocapthus*, and I think, are nearer that genus than *Pellorneum*.

iii. *P. ignotum*, Hume.

Have neither a rufous cap nor a streaked or striped lower plumage, otherwise in structure very like *P. palustre*.

N. B.—I think this species should be placed in *Drymocapthus*.

KEY.

A.—Breast boldly striped with dark brown.

a.—Mantle not streaked.

a¹. Crown pale rufous *P. r. ruficeps*.

b¹. „ „ chestnut *P. r. subochraceum*.

c¹. „ „ dark chestnut.. .. *P. r. granti*.

b.—Mantle streaked.

d¹. Upper back with dark brown streaks .. *P. r. mandelli*.

e¹. „ „ „ „ „ „ .. *P. r. minus*.

B.—Breast streaked brown and greyish-buff .. *P. palustre*.

C.—Under plumage not striped or streaked.

f¹. Breast tinged brownish *P. i. ignotum*.

g¹. „ „ bright rufous *P. i. cinnamomeum*.

Distribution.—*P. r. ruficeps*, Swainson, practically the whole Peninsula of India, except the extreme South; *P. r. granti*, Harington, Travancore; *P. r. mandelli*, Blanford, from Nepal to Assam, and N. and N.-E. Burma; *P. r. minus*, Hume, Central Burma; *P. r. subochraceum*, Swinhoe, Lower Burma; *P. palustre*, Jerdon, Assam; *P. i. ignotum*, Hume, Assam; *P. i. cinnamomeum*, Rippon, Shan States, Burma.

PELLORNEUM RUFICEPS RUFICEPS, Swainson.

The Indian Spotted Babbler.

Pellorneum ruficeps, Swainson, Faun. Bor-Am. Birds, p. 487 (1831); Sharpe, Cat., B. M., vii., p. 520; Oates, F. B. I., i., p. 141; Baker, J. B. N. H. S., viii., p. 186.

Description.—Lores buff slightly tipped with black; forehead, crown, and nape rufous brown; a pale buff supercilium, and above the eye mottled with brown; whole upper plumage olive-brown; tail narrowly tipped with white; sides of the head and ear-coverts pale olive-brown or the same colour as the stripes on the breast; chin and throat white; breast white tinged with buff and boldly streaked with umber-brown; flanks and under-tail coverts olivaceous, the latter tipped with white.

Note.—Birds from Western India, Mahableshwar and the Paresnath Hills are similar to birds from Madras and the Wynaad, but have the rufous cap very much paler; the sides of the head and ear coverts buff, and no spots on the side of the head.

Distribution.—The whole of the Indian peninsula, with exception of Travancore, as far north as Khandesh and to the Paresnath Hills. Mr. Stuart

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Baker, in the "Birds of N. Cachar", says that it is fairly common in North and South Cachar, and the nidification the same as *P. mandelli*.

PELLORNEUM RUFICEPS GRANTI, Harington.

The Travancore Spotted Babbler.

P. ruficeps granti, Harington, Bull. B. O. C., xxxiii, p. 81 (1913).

"Adult male.—Similar to *P. ruficeps*, Swains, but altogether a much darker and more richly coloured form. Head dark chestnut; supercilium from behind the eye pale buff with dusky tips; the feathers on the forehead tipped with black; the feathers of the crown pale-shafted; the whole upper plumage, wings, and tail dark olive-brown tinged with rufous, tail not tipped white; chin and throat white; breast white with oblong spot of dark olive-brown producing a heavily streaked appearance; sides of the breast and flanks paler olive-brown; irides dark red-brown; bill above black, below horny-white; legs, feet, and claws pale fleshy. Length 178 mm.; culmen 18; wing 76; tail 66; tarsus 28.

Habitat.—Travancore.

Type in the British Museum: ♂. Mynall, 10. iii. 77. Hume coll.

Observation.—When examining the series of skins of *Pellorneum* in the Natural History Museum, I noticed that a specimen from Travancore was a much darker and more richly coloured bird than the rest. I pointed this out to Mr. Ogilvie-Grant, who kindly wrote out to the Director of the Travancore Museum for the loan of any specimens he might have. The Director most obligingly forwarded five examples of *Pellorneum* from different parts of India, and amongst them one from Travancore which is identical in colour with the one in the National Museum, and shows that the Travancore bird is undoubtedly distinct from the form found at Coonoor and further to the north. I have therefore much pleasure in naming this very well-marked sub-species after Mr. W. R. Ogilvie-Grant." (Harington.)

PELLORNEUM RUFICEPS MANDELLI, Blanford.

The Himalayan Spotted Babbler.

Pellorneum mandelli, Blanford, J. A. S. B., xli, p. ii, p. 165 (1844); Oates F. B. I., i, p. 140; Baker, J. B. N. H. S., viii, p. 18.

P. nepalensis, Sharpe, Cat., B. M., vii, p. 518.

Similar to *S. r. ruficeps*, differs in having the mantle streaked.

Description.—Forehead and supercilium speckled with black; lower neck and upper back streaked with dark brown to black in the centre; and at the sides, the outer half of the feathers striped with the same colour as the breast stripes, the inner half striped with whitish-buff; ear-coverts pale rufous; chin and throat white; breast pale buff, heavily streaked with dark umber-brown, and occasionally a few black stripes at the side of the neck; flanks and under-tail coverts olivaceous, latter tipped white.

Note.—Many birds from Sikhim and other localities have the dark markings on the back wanting, this may be due to age.

Wing: average of 14 specimens, 70 mm.; max., 73 mm.; min., 67 mm., Males slightly the larger.

Distribution.—Nepal, Sikhim, Bhutan Doars, Assam, Dibrugarh, Khasia and Garo Hills, N. Cachar and Manipur, appearing again in the Bhamo District and extending through the Shan States. In the Museum there are 6 specimens from the Southern Shan States; these have the dark markings on the mantle, but are slightly larger, average wing 71 mm., max., 75 mm., min., 70 mm. and, I think, are referable to this species.

Habits and Nesting.—"Breeds from April to July, constructing a loose domed nest of moss, leaves, and fibres on the ground. The eggs three to four in number, are white speckled with chocolate or purplish-brown, and measure .87" × .67".

PELLORNEUM RUFICEPS MINUS, Hume.

The Burmese Spotted Babbler.

Pellorneum minus, Hume, S. F., i., p. 298 (1873) and iii., p. 120; Oates, F. B. I., i., p. 141; Baker, Records, I. M., viii., part (3), p. 263.

P. intermedium, Sharpe, Cat., B. M., vii., p. 519.

This sub-species is intermediate between *P. mandelli* and *P. subochraceum*, having the sides of the neck streaked, but not the brown markings on the back of the former. There are specimens in the British Museum, from the Chindwin, Mt. Victoria, Popa Hill, Meiktila and Thyetmyo. This is a broad belt of country between the habitats of the above two sub-species. There are also some unsexed specimens in the Museum from the Himalayas and Assam which have not the brown markings on the back typical of *P. mandelli*. These I take to be young birds. There is only one immature specimen of *P. r. ruficeps* from Cachar in the Museum. This has no traces of streaks on the upper plumage, these are, therefore, most probably only acquired at a later period.

Mr. Stuart Baker in "Birds of the Abor Expedition" is inclined to suppress this sub-species, no doubt along the border line of two nearly allied species intermediate forms must occur. In this case I think *P. minus*, Hume, has a very wide range of country, and to be entitled to sub-specific rank. The distribution of these two nearly allied sub-species is as follows:—

P. r. mandelli.—Nepal to Assam, appearing again in the Bharno District, thence to the Shan States.

P. r. minus.—The Chindwin, Chin Hills to Mt. Victoria, Myingyan (Popa Hill), Meiktila districts, and Central Burma to Thyetmyo, whence it was first described by Hume.

Description.—Intermediate between *P. r. mandelli* and *P. r. subochraceum*, differs from the former in not having the upper back streaked with dark brown to almost black. Differs from the latter in having the feathers of the mantle and neck streaked, those of the back having pale brownish streaks, those of the side streaked with the same colour as the breast stripes.

Habits.—The same as those of *P. subochraceum* and has the same cry of "Pretty Dear" often repeated. The nest and eggs also the same, the latter being slightly larger.

PELLORNEUM RUFICEPS SUBOCHRACEUM, Swinhoe.

The Malayan Spotted Babbler.

Pellorneum subochraceum, Swinhoe, A. M. N. H. (4), vii., p. 259 (1871); Sharpe, Cat., B. M., vii., p. 521; Oates, F. B. I., i., p. Q. 142.

Similar to *P. r. ruficeps*, differs in having the crown chestnut, and being slightly smaller, and from *mandelli* in having the mantle not streaked.

Description.—Lore fulvous white with black shafts; forehead, crown and nape light chestnut; a broad supercilium to the nape creamy-white to buff, the feathers immediately above the eye speckled with blackish; ear-coverts pale rufous buff, with a surrounding darker line; upper plumage, exposed parts of the wings and tail, olive-brown; outer edge of primaries olivaceous to ochraceous; tail narrowly tipped with white; chin and throat white; lower plumage light fulvous, flanks darker; breast and sides of the body streaked with dark umber-brown; under tail-coverts fulvous with large central dark markings.

Wing: average of 11 specimens, 64 mm.; max., 68 mm.; min., 62 mm. Males slightly the larger.

Bill, "Iris red; upper mandible dark brown, lower yellow at the base, changing to light brown at the tip; legs light brownish-yellow." (Oates.)

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Distribution.—Malay Peninsula, Tenasserim, Pegu, Toungoo, the Karen Hills. (Oates).

Habits and Nesting.—A noisy little bird, keeping to dense under growth, and has a monotonous call of "Pretty dear, pretty dear," which it continuously utters throughout the breeding season. It probably has two broods during the year, nesting from March till August. Building a flimsy domed nest of grass and leaves, which is always placed on the ground, and generally well concealed amongst the fallen leaves. And lays three white eggs thickly speckled with brown, and measure .82" by .62".

PELLORNEUM PALUSTRE, Jerdon.

The Marsh Babbler.

Pellorneum palustre, Jerdon, Ibis, 1872, p. 300; Sharpe, Cat., B. M., vii., p. 522; Oates, F. B. I., i., p. 143; Baker, J. B. N. H. S., viii., p. 186.

Description.—As in the Fauna of India, Oates.

Habits.—"A rare bird here, and unlike the other members of the genus, never found to my knowledge outside grass land. I have never noticed near swamps or marshy land as its name would seem to infer it should be found."

Nesting.—"The nest and eggs are indistinguishable from those of *P. ruficeps* or *mandelli*, but are smaller, averaging about .87" by .64". (Baker, Birds, N. Cachar.)

PELLORNEUM IGNOTUM IGNOTUM, Hume.

The Assam Babbler.

Pellorneum ignotum, Hume, S. F., v., p. 334 (1877).

Dryocataphus ignotus, Sharpe, Cat., B. M. vii., p. 556.

Pellorneum ignotum, Oates, F. B. I., i., p. 144; Baker, J. B. N. H. S., viii., p. 186.

"Whole upper plumage rufescent olive-brown, exposed part of the wings and tail rufescent, the shafts of the feathers nowhere markedly paler; and the forehead not differing from the crown; lores and over the eye greyish-brown; ear-coverts brown with paler shafts; sides of the neck like the back; chin, throat, centre of the breast and abdomen dull white, very slightly mottled with greyish, remainder of lower plumage olive-brown tinged with rufous."

"Iris dark brown; legs and feet light sienna-grey." (Oates.)

Wing: average of 5 specimens, 57 mm.; culmen, 13 mm.; tarsus, 24 mm.

Distribution.—Assam and Naga Hills.

Nest.—A deep cup, sometimes domed, never actually on the ground and more compactly built, and from 2 to 4 feet off the ground, 2, 3 and 4 eggs laid. Eggs pale pink freckled with dark brownish-red. Measure .72" to .90" by .57 to .62". Very shy and retiring.

PELLORNEUM IGNOTUM CINNAMOMEUM, Rippon.

Rippon's Babbler.

Dryocataphus cinnamomeum, Rippon, Bull., B. O. C., xi., p. 12 (1900); Harington, J. B. N. H. S., xxi, p. 115; *ibid*, Ibis, 1914, p. 11.

Description.—Upper plumage olive-brown, not rufescent; lores and round the eye ashy-grey; chin and throat whitish, with arrow like dark grey ends to the feathers; sides of the neck like the back; breast bright rufous; whitish on the abdomen; flanks olive-brown tinged with rufous.

Note.—The only specimen from Mt. Victoria is rather paler rufous on the breast, and throat not so conspicuously spotted.

Wing: average of 4 specimens, 55 mm., max., 57 mm. min., 55 mm., Culmen, 12 mm. Tarsus, 24 mm.

Distribution.—Shan States, Burma, over 5,000 ft., and Bhamo Hills.

Habits and Nesting.—I only procured one nest containing three eggs of this species, these are very similar to those of *P. ignotum*.

SCOTOCICHLA, Sharpe, 1883.

Sharpe, Cat., B. M., vii., p. 522; Buttkofer, Notes Leyden Museum, xvii., p. 94.

"Bill slender, narrow, nasal aperture linear, rictal bristles extremely short; tail graduated, nearly as long as the wing; tarsi and toes very long and stout, the first less than half the tail in length; crown darker than the back. It differs from *Drymocapthus*, which it otherwise much resembles, by the tail being more than twice the length of the tarsus; and from *Pellorneum*, under which it is ranged by Oates, by the dark cap and the absolute want of dark shaft-stripes on the lower surface." (Buttkofer.)

This genus so far only contains one species, which has the following characteristics: a short rounded wing, which fits close to the body, the first four primaries graduated; tail shorter than the wing; bill long and straight, but not as long as the hind toe and claw; rictal bristles very short; no hairs overhanging the nostrils; and under plumage not streaked. I think that the following species should be included in this group, as they all the above characteristics, and seem to be much nearer it, both in appearance and in description of plumage, than to *Drymocapthus*, *D. capistratus*, from Java, *D. captistratoides* from Borneo, and *D. nigricapatus* from S. Tenasserim.

SCOTOCICHLA FUSCICAPILLA, Blyth.

The Brown-capped Babbler.

Drymocapthus fuscicapillus, Blyth, J. A. S. B., xviii., p. 815 (1849).

Scotocichla fuscicapilla, Sharpe, Cat., B. M., vii., p. 523.

Pellorneum fuscicapillum, Oates, F. B. I., i., p. 143.

Description.—As in Oates, F. B. I. There are undoubtedly two races, one from the drier localities which is paler and the other darker form from damper localities.

Habitat.—Ceylon. I can find nothing definite recorded as to its nidification.

DRYMOCATAPHUS, Blyth, 1849.

Buttkofer, Notes, Leyden Museum, xvii., p. 74 (1895).

"This genus is easily distinguished by the following combination of characters: Bill slender, nasal aperture linear, rictal bristles wanting or feebly developed, never surpassing the nostrils, tarsus half the length of the tail, long, toes large and strong, above the eye a pale superciliary stripe."

They have the following characteristics: a short rounded wing, fitting close to the body, the first four primaries graduated; wing longer than the tail; bill straight, shorter than the hind toe; claw of hind toe long; rictal bristles well developed; nostrils overhung with hairs; under plumage not streaked.

NOTE.

DRYMOCATAPHUS RUBIGNOSUS, Walden.

Trichostoma rubignosa, Wald., A. M. N. H. (4) xv., p. 402 (1875).

Drymocapthus rubignosus, Oates, F. B. I., i., p. 145.

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See Footnote p., 339, Jour. Bom. Nat. Hist. Soc., Vol. XXIII, No. 2.
This is the young of *Pomotorhinus c. imberbis*.

DRYMOCATAPHUS TICKELLI TICKELLI, Blyth.

Tickell's Babbler.

Pellorneum tickelli, Blyth, J. A. S. B., xxviii., p. 414 (1859); Sharpe, Cat., B. M., vii., p. 557; Oates, F. B. I., i., p. 146.

Trichostoma minus, Bingham, S. F., ix., p. 179.

Description.—Whole upper plumage fulvescent olive-brown; the feathers of the forehead paler, and with no tinge of olive; the feathers of the crown with pale shaft stripes; lores, a very indistinct eye-brow, and the feathers round the eye pale fulvous; ear-coverts pale fulvous-brown, with paler shaft stripes; the sides of the neck the same as the back but paler; chin, throat, and in a few birds, the centre of the breast whitish; otherwise the whole lower plumage uniformly ochraceous throughout, darker on the flanks.

"Bill dusky above, pale flesh colour beneath; iris reddish-brown; legs and feet fleshy white." (Oates).

Wing: average of 14 specimens, 61 mm., max., 64 mm., min., 57 mm. Females slightly smaller; exposed culmen, 14 mm.; tarsus, 25 mm.

Note.—Dr. Sharpe has identified *Trichostoma minus*, Hume, as being this species, there is also one of Col. Bingham's specimens, so labelled, in the Tring Museum, from Tenasserim. Col. Bingham found the nest of *T. minus*, and distinctly says that the eggs are white spotted with pink. Mr. Stuart Baker has also taken the eggs of *D. t. tickelli* in Assam, these are a pale green spotted with brown. It is most improbable that this species lays two distinct types of eggs, and I think it will be most probably found that the birds from Tenasserim are different to those found in Assam. In this last locality we have also another very closely allied sub-species, *D. assamensis*, Sharpe, which also lays greenish coloured eggs spotted with brown. And I think its most improbable that two so nearly allied sub-species should be found in the same locality, Mr. Oates gives the Khasia Hills as the habitat for both these species and I should not be surprised if *D. t. tickelli* and *D. t. assamensis* proved to be one and the same species.

I hope, therefore, that some one more competent than myself will settle the identity of these birds and their distribution.

Distribution.—Tenasserim, the Pegu Yomas, Karen Hills and Southern Shan States, Oates also gives the Khasia hills and Manipur.

Nesting.—Bingham, in Oates "Nest and Eggs," says, "on the 15th March I found a little domed nest made of dried bamboo leaves, and lined with fine roots, placed in a cane bush, a foot or so above the ground. It contained three tiny white eggs, with minute pink dottings chiefly at the larger end, one egg, however, is nearly pure white. I shot the little bird off the nest, which Mr. Hume identifies as this species."

Stuart Baker, J. B. N. H. S., viii., p. 189, first notices the difference between his eggs and those described by Bingham, and then describes the nest and eggs. It builds a domed shaped nest on or near the ground, and lays 3 or 4 eggs. These have the ground colour a pale greenish-grey, and the markings consist of numerous freckles and blotches of pale reddish-brown. Measuring .77" to .88" by .58" to .66".

DRYMOCATAPHUS TICKELLI ASSAMENSIS, Sharpe.

Austin's Babbler.

Drymocataphus assamensis, Sharpe, Cat., B. M., vii., p. 557 (1883); Oates, F. B. I., i., p. 147.

"This species differs from *D. tickelli*, in having the upper plumage rufescent olive-brown, and in having a longer tarsus." (Oates.)

Description.—Upper plumage rufescent olive-brown, the feathers with pale shaft stripes; outer edge of the primaries dull rufous; lores pale fulvous; sides of the neck reddish-buff; sides of the head fulvous with dark mottlings; chin, throat and breast fulvous tinged with ochraceous, in some specimens the throat is faintly mottled; flanks and abdomen dark olive-brown.

Distribution.—Khasia hills, Dollah and Sadiya in Assam.

Note.—There are numerous specimens of *D. tickelli* and *assamensis* from Assam in the Tring Museum, and I failed to notice any difference between them.

Nesting.—The nest and eggs seem to be the same as the last species.

DRYMOCATAPHUS NIGRICAPITATUS, Eyton.

The Black-capped Babbler.

Brachypteryx nigricapitata, Eyton, P. Z. S., 1839, p. 103.

Drymocataphus nigricapitatus, Sharpe, Cat., B. M., vii., p. 554; Oates, i., p. 145.

Description.—As in Oates, F. B. I.

Distribution.—The extreme south of Tenasserim. I can find nothing recorded as to its habits or nidification.

Note.—This species has a conspicuous black cap, and appears to agree in every particular with *Scotocichla*, and I think should be placed in that genus. Its rectal bristles are very short, no hairs overhanging its nostrils, and wing slightly longer than the tail.

There are also several other so-called *Drymocataphus* from the Malay Peninsula and Island which I think should be placed in *Scotocichla*.

RHOPOCICHLA, Oates, 1889.

Oates, F. B. I., i., p. 159.

"This genus differs from *Aleippe* in having the nostrils roundish, exposed, and pierced in the anterior part of the membrane, and in having a much shorter tail when compared to the wing. The eggs of the two genera are also different." (Oates.)

This genus is confined to Southern India and Ceylon, and forms a connecting link between *Pellorneum* and *Aleippe*, the shape of its bill being like the last, whilst its eggs and nidification are like those of the former.

They have besides the above characteristics, the usual short rounded wing; bill curved throughout and deepest at the gape, also the bill is wider than it is deep; no hairs overhanging the nostrils, and rectal bristles well developed.

KEY.

(Oates, F. B. I., i., p. 160).

- | | |
|---|----------------------------|
| a. Crown and sides of the head black .. | .. <i>R. atriceps</i> . |
| b. Forehead and ear-coverts only black .. | .. <i>R. nigrifrons</i> . |
| c. Ear-coverts only blackish | .. <i>R. bourdilloni</i> . |

RHOPOCICHLA ATRICEPS ATRICEPS, Jerdon.

The Black-headed Babbler.

Brachypteryx atriceps, Jerdon, Madras Journ., L. and S., x., p. 250 (1839).

Aleippe atriceps, Sharpe, Cat., B. M., vii., p. 625.

Rhopocichla atriceps, Oates, F. B., I., p. 160.

Description.—As in Oates, F. B. I.

Distribution.—Nilgiris, and West Coast of India.

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RHOPOCICHLA ATRICEPS BOURDILLONI, Hume.

Bourdillon's Babbler.

Alcippe bourdilloni, Hume, S. F., iv., pp. 399 and 485; Sharpe, Cat., B. M., vii., p. 626.

Rhopocichla bourdilloni, Oates, F. B. I., i., p. 260; Ferguson, J., B. N. H. S., xv., p. 260; Baker, Ibis, 106, p. 101.

Description.—As in Oates, F. B. I.

Distribution.—Travancore.

Its nest and eggs appear to be the same as the other two sub-species.

RHOPOCICHLA ATRICEPS NIGRIFRONS, Blyth.

The Black-fronted Babbler.

Alcippe nigrifrons, Blyth, J. A. S. B., xviii. (1849); Sharpe, Cat., B. M., vii., p. 625.

Rhopocichla nigrifrons, Oates, F. B. I., i., p. 160.

Description.—As in Oates, F. B. I.

Distribution.—Ceylon.

GROUP VI.

GYPSOPHILA, Oates, 1883.

Oates, F. B. I., i., p. 149.

"The Genus *Gypsophila* contains one remarkable bird which is confined to certain limestone mountains in Tenasserim. Its plumage is of the most extraordinary character, and even in the very large series of this bird in the Hume Collection affords no clue to its changes. For the present I locate this genus among the *Timeliinae*, but I feel sure that this is not its proper place. Its place in the system must remain undetermined until its plumage from the young to the adult stage is properly understood.

"In structure *Gypsophila* is close to *Pellorneum* from which it differs chiefly in its longer rectal bristles and stronger bill, the upper plumage is squamated in appearance, owing to the feathers being margined with black" (Oates). It has the following characteristics: a short rounded wing, the first four primaries graduated; wing and tail about equal in length; feathers of the forehead soft; rectal bristles long and well developed; bill straight and as long as hind-toe and claw; no hairs overhanging the nostrils; in habits, however, it appears to be non-Timeliine being lively, and not at all shy, in fact appears to be very Thrush-like. Probably when the colour of its eggs are known its true position will be determined.

The name *Gypsophila* is pre-occupied in Botany, and the name *Curzonina* has been proposed, but I believe not yet adopted.

GYPSOPHILA CRISPIFRONS, Blyth.

The Limerock Babbler.

Turdinus crispifrons, Blyth, J. A. S. B., xxiv., p. 269 (1855).

Gypsophila crispifrons, Sharpe, Cat., B. M., vii., p. 561; Oates, F. B. I., i., p. 149.

Description.—As in Oates, F. B. I.

Distribution.—So far has only been recorded from the central limestone ranges of Tenasserim. This interesting species is well worth studying, and it is hoped members station at Moulmein will try and discover its nest and eggs, besides collecting a series of its skins.

GROUP VII.

MALACOCINLA,* Blyth, 1845 (*Turdinus*, Blyth).

Turdinus, Blyth, 1844; Oates, F. B. I., i., p. 153.

"The genus *Turdinus* differs from all the other genera of this sub-family with stout straight bills in having the nostrils oval and exposed, not protected by a membrane. As restricted here, it contains but one Indian species. This has a very short tail." (Oates).

"This genus is sufficiently distinguished by the following characters:—

Plumage, never mottled on upper surface which is olive-brown; flanks and undertail-coverts more or less tinged with fulvous; bill short, clumsy and rather high; nasal aperture oval and placed in front of the nasal groove, which is covered by a membrane; rectal bristles rather strong, but never reaching far beyond the nostrils; wing rounded; tail short, not fully two-thirds of the length of the wing; tarsus and toes long; especially the hind toe, tarsus fairly two-thirds of the length of the tail and longer than one-third of the length of the wing."—*Buttkofer, Notes Leyden Museum, cvii., p. 78.*

The above two descriptions of this genus are very conflicting and Oates points out the distinguishing features, namely, the exposed nostril, which has no overhanging membrane; and its short tail.

The chief other characteristics are—

A short round wing, fitting close to the body. The first four primaries graduated; tail shorter than the wing; rectal bristles well developed; no hairs overhanging the nostrils; feathers of the forehead soft, bill stout and straight, and fairly long equal to the hind toe and claw; the nostrils pierced in the membrane and exposed; no hairs overhanging the nostrils.

MALACOCINLA ABBOTTI, Blyth.

Malacocinla abbotti, Blyth, T. A. S. B., xiv., p. 601 (1845).

Turdinus abbotti, Sharpe, Cat., B. M., vii., p. 277; Oates, F. B. I., i., p. 154.

Description.—As in Oates, F. B. I.

Note.—I found this bird nesting in February in Rangoon, so it possibly has two broods in the year.

GROUP VIII.

ALCIPPE.

In this sub-division of the *Timeliida*, I have placed the following genera: *Pseudominla*, *Scheniparus*, *Alcippe*, *Proparus*, *Siva*, and *Lioparus*. It includes birds which are both, solitary and terrestrial in habits, and those which are arboreal and go about in small flocks. I have called it the "*Alcippe*" Group, as that genus may be taken as typical of the whole, half its members being purely *Timeline* in habits, that is shy, solitary, and haunting the ground; the others have all the habits of *Siva*, being sociable, and going about in family parties, and frequent trees and bushes.

By placing all these genera in one group, I have no wish to do away with their generic rank, as each genus has its well marked characteristics although they appear to grade from one into the other. This, I think, may be probably due to the fact that they are still in a process of evolution, as we find each species represented by numerous geographical races.

* The following other members of this genus are:—
M. sepiaria, Java; *M. minor*, Java and Sumatra; *M. rufiventris*, Borneo;
M. perspicillata, Borneo.

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This group has the following characteristics: wing and tail about equal in length; bill, small, stout, and gently curved; the feathers of the head ample; plumage soft and dense; and small in size.

PSEUDOMINLA. (*Sittiparus*, Oates.)

Has the tail slightly shorter than the wing, and only slightly graduated; a very small bill; and no hairs overhanging the nostrils. They are purely arboreal in habits, and appear to build dome-shaped nests, and lay spotted eggs.

SCHÆNIPARUS.

Are small birds very similar to the last, with the same noticeable dark stripes on the head, but differ in having a longer and graduated tail, a stouter bill, and are terrestrial in habits. They build dome-shaped nests, which are placed on or near the ground, and lay eggs remarkably like those of the English Garden-Warbler and Black-Cap. They, however, appear to grade into *Alcippe*, as *S. brunneus*, Gould, at first sight can easily be mistaken as belonging to that genus.

ALCIPPE.

Differs from the last two genera in having the nostrils overhung with hairs, the majority, however, have the dark stripes on the head. This genus is peculiar in containing birds very similar in plumage, but differing in habits. The eggs of all are very highly coloured and vary greatly in marking, one type is very like the eggs of the Chaffinch and Brambling, and also to the pink type of Black-Cap. I have, however, never heard of any *Alcippe* laying eggs with a greenish or yellow ground colour, and therefore similar to those laid by *Scheniparus*, nor any of the last laying the pink type of egg.

PROPARUS.

Is a well defined genus of small birds, which approach *Alcippe* in appearance, many having the conspicuous dark stripes on the head. Their characteristics are their small bill, and remarkably long hind-claw. They are only found at very high elevations, and consequently very locally distributed.

SIVA.

Were placed by Mr. Oates in the *Sibiinæ*, I think the Blue-winged Sivas (*Cyanuroptera*) approaches much nearer, both in structure and appearance, to *Alcippe* and *Proparus*. They are purely arboreal in habits, and lay highly coloured blue eggs of a finch-like type. They are birds of a very handsome plumage, and are chiefly noticeable for their tail feathers which are obliquely truncated.

LIOPARUS.

This genus consist of only one species peculiar to the Himalayas. I have placed it in this group, but think its position doubtful, as it shows a marked relationship to *Chelidorrhynx*, Hodgson, (Yellow-bellied Flycatcher). Nothing definite appears to be known about its habits or nidifications.

PSEUDOMINLA, Oates, 1894.

Pseudominla, Oates, Ibis, 194, p. 480.

Proparoides, Bianchi, Bull., B.O.C., xii., p. 55 (1902).

Sittiparus, Oates, F.B.I., i., p. 171.

Minla, Sharpe, Cat., B.M., vii., p. 606.

As the generic name *Sittiparus*, Oates, is pre-occupied Mr. Oates has proposed the above name.

It has the following characteristics: a small rounded wing; legs and feet stout; non-migratory in habits; tail slightly shorter than the wing and scarcely graduated, and the feathers of the tail pointed; bill broader than it is deep; nostrils not overhung by hairs; hind toe and bill equal in length.

KEY.

- a. Head grey, a long black supercilium. .. *P. cinerea*.
- b. Head chestnut, no black supercilium, size small, wing 53—57 mm.
 - a¹. Crown dark chestnut *P. c. castaneiceps*.
 - b². Crown light chestnut. *P. c. brunneicaudata*.
- c. Head dark chestnut, size larger, wing 62—67 m. *P. c. soror*.

PSEUDOMINLA CINEREA, Blyth.

The Dusky-green Babbler.

Minla cinerea, Blyth, J.A.S.B., xvi., p. 449 (1849); Sharpe, Cat., B. *Sittiparus cinereus*, Oates, F.B.I., i., p. 171; Baker, J., B.N.H.S., viii., p. 197.

Lores, and a long supercilium yellowish-white; a black spot in front of eye, above this a broad black line extending to nape; head crown and nape, greyish washed with green, each feature broadly tipped black; upper plumage greyish-green; wings and tail brownish, washed on the outer edge with the same colour as back. Cheeks yellowish-white tipped with black; ear-coverts and sides of the neck paler than the back and more greenish; chin throat and whole lower plumage yellow, olivaceous on the flanks.

Wing, 53—58 mm.; culmen, 10 mm.; tarsus, 23 mm.

Distribution.—Nepal, Sikhim and Khasia Hills.

PSEUDOMINLA CASTANEICEPS CASTANEICEPS, Hodgson.

The Chestnut-headed Babbler.

Milna castaneiceps, Hodgson, Ind. Rev., 1838, p. 38; Sharpe, Cat., B. M., vii., p. 698.

Sittiparus castaneiceps, Oates, F.B.I., i., p. 172.

Description.—Lores and forehead, yellowish-white; crown and nape, a dark chestnut-brown; the feathers of the head with pale shaft stripes; on the fore part of the crown a few feathers have the inner half whitish; a broad supercilium, and just above and below the eye white; a spot in front of the eye and a long streak behind, and a spot on the cheek black. Ear-coverts whitish, upper plumage, birds from Sikhim, Manipur, Chin Hills, are olive-green tinged with fulvous; birds from the Shan States, and the Tenasserim, olive-green with no fulvous tinge. Greater wing-coverts black, winglet white, the earliest primaries edged with greyish-white, the others and secondaries edged chestnut, tertiaries black edged olive-green; chin, throat, and breast whitish bordered with fulvous and few in distinct fulvous spots on the chin and throat; flanks and under tail-coverts olivaceous tinged with fulvous; tail slaty edged greenish on outer web.

Wing, 53—67 mm.; tail, 45 mm. culmen, 9 mm.; tarsus, 22 mm.

Distribution.—Sikhim, Naga, Manipur, and Chin Hills, Shan States and Tenasserim.

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PSEUDOMINLA CASTANEICEPS BRUNNEICAUDATA, *Sharpe.

*The Shillong Chestnut-headed Babbler.**Minla brunneicaudata*, Sharpe, Cat., B. M., vii., p. 609.

Description.—Similar to *P. c. castaneiceps*, differs in having head much paler and more rufous; the chestnut on wings paler; tail brownish and no yellow on the forehead.

Wing, 58—62 mm.; culmen, 10 mm.; tarsus, 22 mm.

Distribution.—Shillong, Khasia Hills.

Numerous specimens in the Museum, from the above locality, all with the light-coloured head.

Note—This another well marked case of isolation in the "Assam Backwater," birds from the North and East being the last sub-species and quite distinct.

SCHENIPARUS, Hume, 1874.

Oates, F. B. I., i., p. 168.

"With the genus *Schœniparus* we enter on a group of small birds with short blunt bills like the Tits, and with very strong feet. Their proper position is undoubtedly in this sub-family, both on account of their structure and their habits."

This genus differs from the *Alcippe* in having no hairs overhanging its nostrils, and in having a strongly graduated tail. Another interesting point between these two families is that *Alcippe* build cup-shaped or cradle-like nests placed well above the ground, and lay eggs of a "Chaffinch" or "Brambling" type, having a pinkish ground colour, and smears and smudges of a darker pink, and still darker spots; while *Schœniparus* all build domed nests on or near the ground, and lay eggs of the "Garden Warbler" type having a greenish or yellowish ground colour, with smears and smudges of brownish, with darker spots. They are also essential ground birds and thoroughly Timeliine in habits. They have the following characteristics: a short round wing, the first four primaries graduated; wing and tail about equal, the latter strongly graduated; a stout short bill; nostrils covered by a membrane, and not overhung by hairs; and rectal bristles weak. They also have brownish coloured heads with two conspicuous black lines, running from above the eyes to the nape.

KEY.

Schœniparus consist of three species, one *S. rufigularis*, Mandelli, is confined to Assam and Manipur. Whilst the second *S. dubius*, Hume, consist of a number of local races extending from Assam into Burma and China. The third *S. brunneus*, inhabiting China, Formosa and Hainan.

a. Chestnut band across the breast .. *S. rufigularis*.

b. No " " " " " .. *S. dubius* and sub-species.

SCHENIPARUS RUFIGULARIS, Mandelli.

The Red-throated Tit-Babbler.

Minla rufigularis, Mandelli, S. F., i., p. 416 (1873); Sharpe, Cat., B. M., vii., p. 610.

* PSEUDOMINLA CASTANEICEPS SOROR, Sharpe.

Sharpe, P. Z. S., 1887, p. 439.

"Closely allied to *M. castaneiceps*, from which it differs in its much larger size, darker olive-brown coloration, and deep chestnut, not orange, edging to the quills."

"Irides dark brown." (Sharpe.)

Wing, 67 to 62 mm.; culmen, 13 mm.; tarsus, 24 mm.

Habitat—Malay Peninsula.

Scheniparus ruficularis, Oates, F.B.I., i., p. 170; Baker, Ibis, 1906, p. 102.

Description.—Forehead, crown, and nape, chestnut; lores, supercilium, and immediately above the eye, white; a conspicuous line above the white supercilium to the nape, black; upper plumage, exposed parts of the wings and tail, olive-brown; outer edge of the primaries fulvous; a ring of white feathers round the eye; ear-coverts blackish; chin and throat white; a conspicuous chestnut band across the bottom of the throat; breast whitish tinged with grey; flanks olivaceous, under tail-coverts and thighs rufous.

"Legs and feet pale yellowish horny-brown; bill black." (Oates.) Wing, 53 to 56 mm.

Distribution.—Bhutan Duars, Daphla Hills, Naga Hills, and Manipur.

Nesting and Habits.—Mr. Stuart Baker says that this Tit-Babbler is fairly common along the foot hills in Assam up to about 3,000 ft. And that it builds a dome-shaped nest, which is placed on or near the ground, and lays 3 to 4 eggs, which have a pale yellowish ground colour with a faint tinge of green, the markings consist of clouds, blotches and spots of pale brown, above these a few dark brown dots and scrawls of a darker brown, and vary between .70" to .80" x .51" to .57".

KEY—*S. dubius* and sub-species.

—	<i>S. mandelli</i> .	<i>S. intermedius</i> .	<i>S. dubius</i> .	<i>S. genestieri</i> .
<i>Locality</i> .	Assam to the Chin Hills, W. Burma.	Bhamo Hills to the Shan States.	Tenasserim ..	Yunnan and China.
<i>Colour of Head and Nape</i> .	Dull golden-brown, black edges to feathers very conspicuous.	Dull golden-brown, edges of feathers only faintly darker.	Bright golden-brown, edges of feathers only faintly darker.	Dull golden-brown, which is confined to the head; edging to feathers faint.
<i>Sides of the Neck</i> .	Distinctly striped, black and yellowish.	Indistinctly striped	Stripes obsolete and hidden.	Not striped.
<i>Upper plumage</i> ..	Olive-brown ..	Olive-brown ..	Olive-brown, tinged with ochraceous.	Olive-brown.
<i>Under plumage</i> ..	Buff	Whitish	Whitish	Buff.

S. d. dubius, *mandelli*, *genestieri* and *intermedius*, differ by having a black and white double eye brow, which is black and grey in the *brunneus* group.

Note.—*S. genestieri* has no traces of stripes on the neck.

S. dubius very faint indications, which have to be looked for.

S. intermedius has very irregular stripes on the side of neck.

S. mandelli stripes very noticeable, also a very broad supercilium which converge on the back, the feathers of the back often being edged with back.

Birds from Bhamo are intermediate between *S. mandelli* and *intermedius*, but nearer the latter.

SCHENIPARUS DUBIUS DUBIUS, HUME.

The Tenasserim Tit-Babbler.

Proparus dubius, Hume, Proc. A.S.B., 1874., p. 109.

Minla dubius, Sharpe, Cat., B.M., vii., p. 611.

Scheniparus dubius, Oates, F.B.I., i., p. 163.

Description.—Lores dusky; forehead, crown, and nape, golden-brown, the forehead paler; all the feathers of the head having indistinct dark edges; a supercilium, from just above the eye to the nape, white; above this a border-

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ing black line also to the nape, where they converge the feathers on the nape being tipped with black; ear-coverts and sides of the neck fulvous; upper plumage olive-brown tinged with ochraceous; tail tinged rufous; sides of the neck with faint indications of stripes, the inner edge of the feathers, just below the black and white supercilium, yellowish, the outer edge being the same colour as the back; chin, throat, and centre of breast, whitish; sides of breast tinged with ochraceous flanks olivaceous.

"Legs and feet fleshy; bill dull black or brown; iris sometimes yellowish-red, pale yellow, to slaty-pink." (Oates.)

Wing, 53 to 58 mm.; culmen, 12 mm.; tarsus, 25 mm.

Habits and Nesting.—As in the Fauna of India.

SCHENIPARUS DUBIUS MANDELLI, Godwin-Austin.

The Assam Tit-Babbler.

Scheniparus mandelli, Godwin-Austin, A.M.N.H. (4), xvii, p. 33, 1876; Oates, F.B.I., i., 169.

Minla mandelli, Sharpe, Cat., B.M., vii, p. 610.

Description.—Similar to *S. dubius*. Differs in having the feathers of the head darker, distinctly margined with black; the black supercilium more pronounced, and the upper-back streaked with black; upper plumage not tinged with ochraceous, but more olive; sides of the neck distinctly striped, the outer edges of the feathers being black, the inner rufous buff; chin, throat, centre of breast buff; ear-coverts hair brown; flanks olivaceous; and tail tinged with rufous.

Wing, from 57 to 63 mm., females slightly smaller; tail, 60 mm.; tarsus, 23 mm., culmen, 12 mm.

Legs and feet pale yellowish fleshy-brown; bill black; iris reddish-brown, red, and dark red-brown." (Oates.)

Habits and Nesting.—Its habits, nest and eggs do not seem to differ from those of *S. ruficularis*.

*SCHENIPARUS DUBIUS INTERMEDIUS**, Rippon.

Rippon's Tit-Babbler.

Rippon, Bull., B.O.C., xi, p. 11; Harington, J.B.N.H.S., xix., p. 117.

**SCHENIPARUS DUBIUS GENESTIERI*, Oustalet.

Scheniparus genestieri, Oustalet, Bull., Mus., Paris, 1897, p. 210; Grant, Ibis 1900, 592.

Scheniparus variegatus, Styan, Bull., B. O. C., viii, 27.

Description.—Similar to *S. dubius*. Differs in having the forehead pale rufous; crown dull golden-brown, with very faint indications of dark edges to the feathers; nape and back olive-brown; the black supercilium not so long and not converging on the back; sides of the neck not streaked; chin, and throat whitish to buff, the sides fulvous; flanks olivaceous, thighs rufous; ear-coverts hair-brown; upper plumage and exposed portions of the wings and tail olive-brown, and not tinged with ochraceous.

Wing, 57 to 63 mm.; tarsus, 25 mm.; culmen, 11 mm.

Habitat.—Yunnan and China.

SCHENIPARUS BRUNNEUS BRUNNEUS, Gould.

Alcippe brunnea, Gould, P. Z. S., 1862, p. 280; Sharpe, Cat., B. M., vii, p. 624; La Touche, Ibis, 1895, pp. 311, 312, 332; *ibid*, 1898, p. 358.

Alcippe obscurior, O. Grant, Bull., B. O. C., xvi, p. 121 (1906).

Scheniparus brunneus, O. Grant, Ibis, 1907, p. 181.

Habitat.—Formosa.

SCHENIPARUS BRUNNEUS SUPERCILIARIS, David.

Ixulus supercilialis, David, Ann. Sci. Nat. (5), xix., Art. 9, p. 4, 1874.

Alcippe brunnea, David and Oust., Ois. Chine, p. 217.

Description.—Similar to *S. dubius*. Forehead tinged with rufous; crown, and nape dull golden brown, feathers with faint darker edges; lores dusky; ear-coverts hair-brown; upper plumage tinged olive, tail rufous; sides of the neck with faint irregular stripes, outer edge of feathers blackish, inner buff; under parts as in *S. dubius*.

Wing, 58 to 61 mm.; tail, 60 mm.; tarsus, 24 mm.; culmen, 11 mm.

Birds from Bharno are intermediate between this species and *mandelli* in having irregular streaks on the sides of the neck, otherwise it is nearest to *intermedius*.

Habits and Nesting.—I found this little bird fairly common up at Sinlum Kava in the Bharno district, its nesting habits and eggs are similar to those of *mandelli*.

ALCIPPE, Blyth, 1844.

Oates, F. B. L., i., p. 156.

This is a very interesting genus, containing birds of very similar plumage, but totally different habits, which have often been confused.

They fall into two natural groups, one which seems to be losing its Timeline habits and approaching *Proparus* in habits, going about in family parties hunting bushes and low trees; or still being solitary, have taken on the roll of Fly-catchers; these have a smaller bill, and more delicate legs and feet. The other group are strictly Timeline, being solitary in their habits, and haunt bushes and undergrowth near the ground; these have a longer bill, and more powerful legs and feet.

Both have the following characteristics: a small rounded wing, the first four primaries graduated; wing and tail about equal, the latter only slightly graduated; nostrils covered by a membrane, and also overhung by hairs; a stout slightly curved bill, which is as broad as it is deep.

KEY.

- (i) Culmen about half the tarsus. The *Nepalensis* Sub-Group.
- (ii) „ more than half tarsus. The *Phaeocephala* Sub-Group.

A. nepalensis and its allied forms are found from Nepal to Burma, and from thence down the Malay Peninsula, and also in China and the Islands of Formosa and Hainan.

Scheniparus superciliaris, O. Grant, Ibis, 1907, p. 182.

Alcippe olivacea, Styan, Ibis, 1896, p. 312.

Scheniparus brunneus, La Touche, Ibis, 1905,

“Under these circumstances David’s name of *I. superciliaris* should be retained for the Chinese form, . . . it is certain that his type specimen came from Foh-kien, whence we have numerous examples.” (Grant.)

Description.—Forehead, crown and nape rufous, the feathers of the forehead black tipped; a broad black line from behind the eye to the nape where they converge together on the upper back; remainder of upper plumage olive-brown; wings tinged with rufous; lores and round the eye rufous; ear-coverts pale fulvous; chin and throat whitish; breast ashy, whitish in the centre; flanks

Wing, 62 mm.; tail, 65 mm.; tarsus, 22 mm.; culmen, 11 mm.

Distribution.—China, Kuatun, Foh-kien, Ichang.

Habits.—Builds a dome-shaped nest, which is very loosely put together, and placed on the ground. Eggs, ground colour greenish, clouded and blotched with pale brown, (and from their description seem very like the eggs of *S. mandelli*), measuring .84” by .62” to .79” by .62” (La Touche).

SCHENIPARUS BRUNNEUS ARGUTUS, Hartert.

Proparus brunneus argutus, Hartert, Nov. Zool, xviii., p. 231 (1910).

Habitat.—Hainan.

The Formosa *S. brunneus brunneus* differs strikingly by its dark undersurface, and darker brown upper plumages.

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A. phaeocephala and its forms extend from Southern and Western India passing through Burma to Siam and the Malay Peninsula.

The range of these two Groups overlap to a great extent, whenever this is the case, the former is only found at high elevations in the hills, while the latter only occurs at much lower levels. From their non-migratory habits, and their wide and often isolated distribution, both have developed into numerous geographical races. These, if compared singly, are often hard to separate, but if series, from different localities, are taken and placed side by side, the differences at once become apparent. A very interesting feature in both these Groups is the great similarity between the two sub-species at either extremity of their geographical areas. We have *A. morrisoniana* from Formosa much nearer in size and general appearance to *A. nepalensis* from Assam, than the latter has to *A. fratercula*, from Burma; and in the other group, *A. brucei*, from Western India is almost identical with *A. davisoni*, sub-sp. nov., from Tavoy and Mergui.

The first bird of this genus to be described was *A. nepalensis*, Hodgson (1838), a bird with a conspicuously striped head. The next was *A. phaeocephala*, Jerdon (1844), a bird with no stripes on the head. The following year (1845), Blyth described *A. phayrei* from Arracan, and unfortunately compared it with both *nepalensis*, and *phaeocephala*, and even went so far as to consider that the want of stripes on the head of *phayrei* denotes that it is probably the young of *nepalensis*.

"All authors have hitherto been satisfied with comparing *A. phayrei* with *A. nepalensis*, two birds which are quite distinct, both in coloration and in size, and which cannot be confounded under any circumstances" (Oates). The first *Alcippe* received by Hume from Burma were from Pegu, which he presumed to be the same as the one already described by Blyth from Arracan, and he remarks on the stripes on the head of the birds he had just received, and considered that Blyth had overlooked this feature. Later on when Hume received specimens from Tenasserim, he at once notices the absence of stripes on the heads of birds from that locality, and this time claims it as a distinguishing feature between these birds and *nepalensis*, while instead of there only being one sub-species, there were three, *A. phayrei* with no stripes on the head from Arracan, *A. magnirostris* with a striped head from Pegu, and *A. davisoni*, sp. nov., from Tenasserim. Again when *A. magnirostris*, Walden, and *A. fusca*, Godwin-Austin, were described, both were compared with the *nepalensis* group.

Nesting.—All the *Alcippe* seem to build cup-shaped nests which are placed in a fork, or a cradle-like ones suspended from twigs, placed at no great height from the ground, and composed of grass and bamboo leaves, lined with fine grass and fibres. Their eggs are of a very distinctive family type, being pinkish with numerous smudges and smears of a darker shade and may be compared to chaffinches, one, however, *A. nepalensis*, lays eggs which seems to be very liable to variation.

(1) The *Nepalensis* Sub-Group.

These birds are slightly smaller, and have a smaller and deeper bill than those in the second group; the majority have conspicuously striped heads; and all with one exception have white rings round the eye. In habits they are very tit-like, going about in parties hunting the bushes, and often behave like fly-catchers; and in India they are only found in the hills.

A. nepalensis, Hodgson, extends from Nepal to the Chin Hills on the West of Burma, and has hitherto been stated to occur in other parts of the province. I have, however, examined all the specimens in the British Museum and find all the so called *nepalensis* from Karennee and Tenasserim are *A. fratercula*.

A. fratercula, Rippon, occurs in the hills on the Eastern side of Burma, and has been recorded from the Bhamo Dist. down to the hills in Tenasserim.

A. yunnanensis, Harington—In the Museum there are a number of specimens collected by Col. Rippon in Yunnan, these are consistently larger and greyer than *A. fratercula*, and I think form a good geographical race.

A. peracensis, Sharpe, inhabits the hills of the Malay Peninsula, this sub-species is noticeable for wanting the white ring of feathers round the eye. (N.B.—There are also specimens of an *Alcippe* from the Malay Peninsula in the Tring Museum which are labelled *A. peracensis*, these have a decided ring of white feathers round the eye.)

A. davidi, Styan, Western China; *A. hueti*, David, Eastern China; *A. morrisoniana*, Swinhoe, the Island of Formosa; *A. cinerea*, Blyth, China; *A. rufescentior*, Hartert, Hainan.

(2) The *Phaeocephala* Sub-Group.

These are larger birds than the last, and have a longer and more curved bill; two sub-species have conspicuously striped heads, and have consequently been confused with the last group; none have the white ring round the eye so noticeable in *A. nepalensis*. They are more Timeliine in their habits, frequenting the ground and dense under-growth, and the majority do not ascend the hills to any great height. Their distribution also differs from the last group; commencing from the South and West we get.

A. phaeocephala, Jerdon, inhabits the hills of Southern India.

A. brucei, Hume., Western India up to Khatiiwar, the Central Provinces, and the Parasnath Hills. (This sub-species is quite distinct from the first, the differences being mentioned by Oates in the F. of B. I.)

A. phayrei, Blyth, probably inhabits Assam, Arracan, and Western Burma. It was first described by Blyth from Arracan, and he particularly notes that the head is not striped. With regard to the distribution of this sub-species, I have not been able to examine sufficient specimens from the following localities so therefore cannot give its exact limits:—

Arracan: the original locality from which this species was described, the type of which, I believe, is in the Calcutta Museum.

Western Burma: there are two specimens in the British Museum, one from the Upper Chindwin, and the other from the foot of the Chin Hills; both these birds are identical. They are very grey above, have no stripes on the head, and want the rufous underparts of *A. phayrei* from Assam. From their distribution, I think, they will be found to be the same as the Arracan species, and will therefore be *A. phayrei*, but if the differences noted above hold good and are considered sufficient to constitute a geographical race, birds from Assam will be *A. fusca*, Godwin-Austin.

A. haringtoniae, Hartert: a bird with conspicuous black stripes on the head is probably found in the whole of North-Eastern Burma. At present has only been recorded from the Bhamo Dist.; Colonel Bingham's specimens from Yatsauk, Shan States, are also referable to this sub-species. In the "Ibis," 1903, Col. Bingham notices the difference between his specimens and birds from Tenasserim, but however, confuses them with *A. fratercula* of the *nepalensis* group.

A. magnirostris, Walden: a bird with sooty brown stripes on the head, specimens in the Museum from Karennee down to about the latitude of Moulmein. This sub-species also probably occurs in the S. S. States and Siam, as Count Glydenstolpe in his "List of Birds from Siam, 1911, 1912," notes that his specimens have striped heads.

I have not been able to examine any birds from Pegu, the original locality from which Hume received his birds with a striped head. Two specimens collected by Mr. J. P. Cook in the Thayetmyo Dist. and now in the Tring Museum have striped heads, but are very much greyer than any from

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Karennee, and with exception of the stripes on the head are very like the two above mentioned specimens in the Museum from Western Burma.

A. p. davisoni, sp. nov.: From the south of Moulmein and Mergui and Tavoy, we get a bird with no stripes on the head, or only very faint traces of any. These are remarkably like *A. brucei* from Western India, and as they cannot be that species I have called them after their collector.

KEY TO INDIAN SUB-SPECIES.

- I. Bill small; a conspicuous white ring round the eye.
 - a. Chin and throat white; flanks tinged olivaceous *A. n. nepalensis*.
 - b. No white on chin and throat; flanks tinged ochraceous.
 - a¹. Wing under 66 mm. or 2·6" *A. n. fratercula*.
 - b¹. Wing over 66 mm. or 2·6" *A. n. yunnanensis*.
- II. Bill large; no ring of white feathers round the eye.
 - c. Head not striped.
 - c¹. Lower back and rump tinged rufous *A. p. phaeocephala*.
 - d¹. No tinge of rufous on back or rump.
 - a². Underparts tinged with rufous *A. p. phayrei*.
 - b². Underparts not tinged with rufous.
 - a³. Grey of head well defined from back *A. p. davisoni*.
 - b³. Grey of head not well defined but merging into the colour of back *A. p. brucei*.
 - d. Head and neck conspicuously striped.
 - e¹. Stripes sooty brown *A. p. magnirostris*.
 - f¹. Stripes intensely black *A. p. haringtoniae*.

Distribution.—*A. n. nepalensis*, Hodgson, Nepal, Sikkim, Butan, Assam, Manipur, Naga and Chin Hills; *A. n. fratercula*, Rippon, Eastern hills of Burma, from Bhamo to Tenasserim; *A. n. yunnanensis*, Harington, Yunnan; *A. n. davidi*, Styan, Western China; *A. n. hueti*, David, South China; *A. n. peracensis*, Sharpe, Malay Peninsula, Mt. of Perak; *A. n. cinerea*, Blyth, Malay Peninsula, and Borneo; *A. n. rufescentior*, Hartert, Hainan; *A. n. morrisoniana*, Swinhoe, Formosa; *A. p. phaeocephala*, Jerdon, S. India; *A. p. brucei*, Hume, W. and Central India; *A. p. phayrei*, Blyth, Assam, Arracan, Manipur and W. Burma; *A. p. haringtoniae*, Hartert, N.-E. Burma; *A. p. magnirostris*, Walden, Karennee and E. Burma; *A. p. davisoni*, Sub-p. Nov., Tenasserim.

ALCIPPE NEPALENSIS NEPALENSIS, Hodgson.

Hodgson's Alcippe or the Nepal Babbler.

Siva nepalensis, Hodgson, Ind. Rev., 1838, p. 89.

Alcippe nepalensis, Sharpe, Cat., B.M., vii., p. 620; Oates, F. of B, I., i., p. 157; Baker, J., B. N. H. S., viii., p. 192.

Description.—A conspicuous ring of white feathers round the eye; head, neck and upper back ashy-brown with a vinaceous tinge; a dark sooty-brown stripe on each side of the head and neck extending down to the back; ear-coverts grey; back olive-brown; exposed portions of the wings and tail yellowish-brown; chin whitish, underparts pale fulvous to olivaceous on the flanks.

Bill in the dried skin particoloured yellowish and black.

"Iris, hazel-brown; bill livid horny; the base of the upper mandible and a line along the culmen black; legs and feet livid fleshy." (Oates.)

"Length, 5"; culmen, 11mm.; wing, 2·3"; tail, 2·4"; tarsus, 8½". (Oates.)

Distribution.—Nepal, Darjeeling, Butan, Assam, Manipur, Naga Hills, and the Chin Hills on the Western side of Burma, I have carefully examined all

the specimens in the British Museum, and the only ones of this species from Burma are those collected by Col. Rippon on Mt. Victoria; all those said to be from other localities in Burma are the next sub-species *A. fratercula*.

Habits.—I can find nothing definite about its habits. Oates says it feeds on the ground, but from the habits of its near relatives from Burma and China, I think this must be wrong. It builds a cup-shaped nest of grass and bamboo leaves and places it in a bush close to the ground. The eggs are very variable. Mr. Stuart Baker gives six distinct varieties.

- (1) Pure white with minute speckles of purply-pink.
- (2) The same with a pinkish ground, but large markings.
- (3) The same as the last with pale pink markings.
- (4) Ground colour pale to deep salmon, and more or less covered with blotches and clouds of pink, approaching the eggs of *Pyctorhis sinensis*.
- (5) Ground colour pale pink to white, with spots of deep purple.
- (6) In a few eggs the markings consist of almost entirely hair-like lines intertwined with one another.

Measuring: .61" to .78" by .48" to .57".

ALCIPPE NEPALENSIS FRATERCULA, Rippon.

Rippon's Alcippe or The Shan State Babbler.

* *Alcippe fratercula*, Rippon, Bull., B.O.C., xi., p. 11., Ibis, 1901, p. 530.

* ALCIPPE FRATERCULA YUNNANENSIS, Harington.

The Yunnan Alcippe.

Harington, Bull., B.O.C., xxxiii., p. 63. (1913).

Similar to *A. fratercula*, Rippon, but larger; the head and neck of a much paler grey, the stripes on the head and neck being less distinct or wanting in some specimens; the underparts also are paler and of a more yellowish tinge; bill smaller.

Adult.—A ring of white feathers round the eye, head and neck pale ashy-grey; indications of two blackish stripes, one on each side of the nape and none on the head; in some specimens these are obsolete or wanting; ear-coverts of the same colour as the head; back pale olive brown; underparts pale ochraceous, tinged with olivaceous on the flanks.

"Iris crimson, upper mandible dark horn-colour, lower mandible like the feet legs and feet livid horn-colour." (Rippon.)

Culmen, 10 mm.; wing, 69.

In *A. fratercula*, culmen, 11 mm.; wing, 62 to 66.

Habitat.—Mountains of Yunnan, from 8,000 to 10,000 ft.

Observation.—There are several examples in the British Museum from the above locality collected by Col. G. Rippon.

Type in the British Museum: Adult. Gyi-dzin-shan, east of Talifu, 8,900 ft., 2. iv.02. G. Rippon coll. (Harington.)

ALCIPPE NEPALENSIS HUETI, David.

David's Alcippe.

David, Ann. Sci. Nat. (5), xix., Art. 9, 1874; Styan, Ibis, 1896, p. 309; La Touche, Ibis, 1899, p. 185; La Touche, Ibis, 1905, p. 29.

Description.—A ring of white feathers round the eye; head and neck a decided grey; the stripes on head and neck very faint or wanting; chin and throat grey; upper plumage olive-brown; flanks and under tail-coverts sandy buff.

Average wing measurement of 4 males, 65 mm. or 2.55", max., 69 mm. or 2.7", min., 63 mm. or 2.47". Bill 11 mm. or .45.

Habitat.—Fokien Province, China.

Nesting and Habits.—It seems to be only found in the mountains of China, where it haunts low-trees and bushes going about in flocks. It builds a cradle-like nest slung from twigs at no great height from the ground, and lays eggs, having a pinkish ground colour, covered with darker smudges and smears, with purplish spots and streaks, in fact very much of the same description as *A. phayrei* or *phaeocephala*.

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Description.—A ring of white feathers round the eye, but not quite so conspicuous as in *A. nepalensis*; head and neck ashy-grey; with no vinaceous tinge; a well defined blackish stripe on both sides of the head and neck extending down to the back; ear-coverts grey; back olive-brown; the exposed parts of the wings and tail yellowish-brown; or the same colour as the back; underparts rich ochraceous, no white on the chin.

"Iris crimson, the legs and bill horn-colour." Bill all of one colour. "Length, about 5.8"; wing, 2.65"; tail, 2.6"; tarsus, .8" (Rippon.) Average wing measurement of 7 unsexed specimens, 64 mm. or 2.5", max., 66 mm. or 2.6", min., 62 mm. or 2.45". Bill 11 mm. or .45".

ALCIPPE NEPALENSIS DAVIDI, Styan.

Styan's Alcippe.

Styan, Ibis, 1896, p. 310.

La Touche, Ibis, 1905.

Description.—A ring of white feathers round the eye; head and neck a light ashy-grey; stripes on head and neck wanting or obsolete; chin and throat grey; breast whitish; flanks and under tail-coverts olivaceous; upper plumage olive-brown.

Wing measurement, male, 68 mm. or 2.68"; female, 67 mm. or 2.64". Bill 12 mm. or .45".

Habitat.—Western China.

ALCIPPE HUETI MORRISONIANA, Swinhoe.

The Formosa Alcippe.

Sharpe, Cat., B. M., vii., p. 621.

Bill, 10-11mm. or .45".

STYAN, IBIS, 1896., p. 311.

<i>Sub-species.</i>	<i>Flanks and under-tail coverts.</i>	<i>Breast.</i>	<i>Throat.</i>	<i>Supercilium.</i>
<i>A. nepalensis</i> ...	Olivaceous ...	Light buff ...	White ...	Very distinct.
<i>A. davidi</i> ...	Do. ...	Do. ...	Grey ...	Very faint.
<i>A. hueti</i> ...	Sandy buff ...	Light vinous buff.	Do. ...	Faint.
<i>A. morrisonia</i> ...	Do. ...	Light sandy buff.	White ...	Distinct.

Distribution.—*A. davidi*, Western China; *A. hueti*, Fukien Province; *A. morrisonia*, Formosa.

ALCIPPE NEPALENSIS PERACENSIS, Sharpe.

Sharpe's Alcippe.

Sharpe, P. Z. S., 1887, p. 439.

Distribution.—The mountains of Perak, Malay Peninsula.

"Male, Irides brown. This bird is common on the higher parts of the hills. It has a loud and musical song."

ALCIPPE NEPALENSIS CINEREA, Blyth.

Blyth, J. A. S. B., xiii., p. 384 (1849); Sharpe, Cat., B. M., vii., p. 622.

Distribution.—Malacca, Malay Peninsula; and Borneo.

ALCIPPE NEPALENSIS RUFESCENTIOR, Hartert.

Proparus nepalensis rufescentior, Hartert, Nov. Zool., xvii., p. 231 (1910).

Habitat.—Island of Hainan

Birds from Tenasserim are slightly smaller, and are inclined to be rufous on the wing. Average wing measurement of 6 ♂♂, 62 mm. or 2.45", max., 64 mm. or 2.5", min., 61 mm. or 2.39". Of 4 ♀♀, 60 mm. or 2.36", max., 61 mm. or 2.35", min., 58 mm. or 2.27".

Distribution.—From the Bhamo Hills, through the Shan States and Karennee, down to Tenasserim, in the hills only. Davison mentions that he only met with this species (*nepalensis*) in the hills of Tenasserim while *A. davisoni* (*phayrei*) inhabits the low country.

Habits.—I found this a very noisy and inquisitive little bird, and not at all shy and retiring like the great majority of small babblers. "Its habits are those of a Fly-catcher, and it seldom descends to the undergrowth, but takes up a position and thence makes short sallies in order to catch flies, precisely in the same manner as the small Fly-catcher do. It is common to find pairs a little distance apart, frequently uttering their call, which consist of five notes, and is loud for the size of the bird." (Rippon.)

Nest and Eggs.—Its nest seem to be similar to that of *A. nepalensis*, those found by me in the Bhamo Hills were composed of either leaves and grass or moss, and were lined with some kind of red fibre, and measured 4" by 1½", and were placed from two to four feet from the ground. All my eggs were of one type, having a white ground colour profusely spotted with rusty red, and measured .87" by .58" to .77" by .57". The eggs of this species most probably vary in the same manner as those of *A. nepalensis*, as Mr. Stuart Baker informs me that he has received eggs from Burma similar to those of that species.

ALCIPPE PHŒOCEPHALA PHŒOCEPHALA, Jerdon.

The Nilghiri Quaker-Thrush.

Thimalia poioicephala, Jerdon, Madras Journ., L.S., xiii., p. 169 (1844).

A. phaeocephala, Sharpe, Cat., B.M., vii., p. 622; Oates, F. of B.I., i., p. 158.

Description.—Head and neck brownish ashy-grey; ear-coverts hair-brown; back brownish olive-brown, tinged with grey on the upper portion, and with rufous on the rump and upper tail-coverts; outer edge of primaries and tail chestnut; chin and throat greyish-buff; breast and under parts ochraceous buff.

Average wing measurement of 10 specimens, 68 mm. or 2.68", max. 69 mm. or 2.69", min., 67 mm. or 2.64". Bill, 14 mm. or .55".

"Iris slaty-grey; legs, feet greyish fleshy, bill horny-brown." (Oates.)

Distribution.—Hills of Southern India, Nilghiris, Coonoor, the Wynnaad and Travancore.

Note.—This is a very rufous species, and easily distinguishable from birds of the Western Ghats.

Habits.—I can find nothing recorded as to the habits of this species, it ascends the hills to 5,000 ft., a height to which none of the others of this group venture upto.

The eggs are delicate pink with a few large conspicuous smudges of darker pink, and dark red spots, and hair-like lines of almost black and measure from .75" to .86" by .58" to .65."

ALCIPPE PHŒOCEPHALA BRUCEI, Hume.

The Bombay Quaker-Thrush.

Alcippe brucei, Hume, J. A. S. B., xxxix. pt. ii., p. 122 (1870); Harington, Bull., B.O.C., xxxiii., p. 61 (1913).

"This sub-species was first described by Fairbank, who forwarded his description to A. O. Hume. The latter, however, does not appear to have

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published it, but refers to the bird from Mahableshwar under the name of *Alcippe brucei*, and notes that it is slightly larger than *A. phaeocephala*.

Oates in the 'Fauna of India, Birds,' i., p. 158, also notes that birds from the Nilghiris and Travancore differ from those found in other localities.

Adult.—Larger and much greyer than *A. phaeocephala*, Jerdon, and lacking the rufous tinge on the plumage of the upper parts. Head and neck ashy-grey, paler, and not so well-defined as in *A. phaeocephala*, and merging into the colour of the back; upper plumage greyish olive-brown, with no rufous tinge; outer edges of the primary-quills and tail-feathers light brown instead of chestnut; lower plumage as in *A. phaeocephala*. Wing, 70-74 mm.; average measurement, 72.

Habitat.—Mahableshwar, the Western Ghats from Rajkote in Khattiwar to Belgaum; the Central Provinces; Pachmari; and the Paresnath Hills, Lower Bengal.

Type in the British Museum: ♂. Mahableshwar, 22. iii., 73 (*Rev. S. B. Fairbank*). Hume coll." (Harington.)

Bill, 4-15 mm.; (note a bird from Rajkote, Khattiwar, is the largest, having a wing of 75 mm.)

ALCIPPE PHÆCEPHALA PHAYREI, Blyth.

The Arracan Quaker-Thrush.

Alcippe phayrei, Blyth, J. A. S. B., xiv., p. 601 (1845); Sharpe, Cat. B. M., vii., p. 623; Oates, F. of B. I., i., p. 158.

A. fusca, Godwin-Austin, J. A. S. B., xlv., p. 197.

As there has been a great deal of confusion over the description of this species, I give Blyth's original description and note.

Blyth's Birds of Burma, p. 601.

A. nepalensis.

Alcippe phayrei, Nobis, J. A. S. B., xiv., p. 601.

"The present one is most nearly allied to *A. poicephala*, Jerdon, and also *Siva nepalensis*, Hodgson . . . But is distinguished by its less rufescent hue, especially on the tail, and its upper and lower coverts, which are devoid of such a tinge, or the upper tail-coverts retain it only in a very slight degree. . . . lower parts fulvescent whitish, whitish on the throat and middle of the belly."

"*Habitat*.—Arracan."

"Wanting the dark scincipital stripes is probably the young."

From the above description it is most noticeable that *A. phayrei* has not a striped head, and also has no rufous tinge on the lower plumage. Unfortunately there are no specimens of *A. phayrei* from Arracan in the Museum, the * type being in the Calcutta Museum. There are, however, two specimens in the British Museum from the Western side of Burma, one from Saw in the Pokokko Dist.; and the other from the Upper Chindwin Dist., where it appears to be common (Oates and Mears, J. B. N. H. S., xviii., p. 80), these are much greyer above than any Assamese birds I have seen, and also want the decided rufous tinge so noticeable in birds from those parts, and in my opinion appear to be much nearer to Blyth's description than the Assam birds, also geographically they are much nearer to Arracan, at present it is impossible to say, whether birds from Assam are *A. phayrei*, or should be *A. fusca* (the type of which is in the Museum, and agree with all other specimens from Assam). If the birds from Assam and

* I have just examined the type specimens of *A. phayrei*, Blyth, from Arracan, kindly forwarded by Dr. Annandale for comparison, these unfortunately are very worn and faded, so that it is impossible to say whether Arracan and Assam birds are identical. It is hoped that any members in Arracan will collect and forward specimens to decide the point. H. H. H. Bombay, 7th March 1914.

Arracan are identical, those from Western Burma will require naming. Mr. Stuart Baker in his "Birds of N. Cachar," J., B. N. H. S., viii., p. 193, seems doubtful about his specimens from that locality, considering them intermediate between the Burmese and the S. Indian forms, by splitting them up into geographical races, I think the variations will be found to be constant.

Description of Birds from Western Burma—

Head and neck light ashy-grey, merging into the upper back; lower back and rump pale olive-grey; ear-coverts pale greyish-brown; chin and throat whitish; breast pale fulvous, flanks tinged with olivaceous.

Wing, sex? 66 mm. or 2.6." Female, 65 mm. or 2.55." Bill, 14. mm.

Description of Birds from Assam—

Head and neck dull brownish-grey, merging into the colour of the back; ear-coverts browner; the remainder of the upper plumage olive-brown; the exposed portion of the wings and tail yellowish-brown; chin and throat greyish; breast and under plumage ochraceous with a decided rufous tinge.

Wing: 3 ♂♂, average 70 mm. (2.75"), [Max. 72 mm., min. 68 mm.]; 2 ♀♀, 66 mm. (2.6"); 4 unsexed, 68 mm. (2.68"). Bill, 14-15 mm.

ALCIPPE PHŒOCEPHALA HARTINGTONIÆ, Hartert.

The Upper Burma Quaker-Thrush.

Hartert, Bull., B. O. C., xxv., p. 10.

Description.—Head and neck ashy grey; two conspicuous black lines on each side of the head and neck extending down to the upper back where they converge; ear-coverts light hair brown; back and upper plumage olive-brown; outer edge of primaries and tail yellowish-brown; chin, throat and underparts ochraceous buff, to olivaceous on the flanks.

Wing measurement of 6 specimens, average 67 mm. or 2.64", max., 70 mm. or 2.75", min., 65 mm. or 2.55." Bill, 12-13 mm.

Distribution.—Probably the whole of N.-E. Upper Burma and the Northern parts of the Shan States. Both Dr. Anderson's and my specimens were procured in the Bhamo Dist. There are also two of Col. Bingham's specimens, from Yatsauk, Shan States, which are referable to this species, to which he draws attention in the *Ibis*, 1903, p. 589.

I only met with this species in the plains near Bhamo itself, and not in the hills where *A. fratercula* is very plentiful.

ALCIPPE PHŒOCEPHALA MAGNIROSTRIS, Walden.

The Lower Burma Quaker-Thrush.

Alcippe magnirostris, Walden, Blyth's Birds of Burma, p. 115 (1875).

A. phayrei, Sharpe, Cat., B. M., vii., p. 623; Oates, F. of B. I., i., p. 158.

Description.—Head and neck brownish-grey almost ashy, and well defined from the back; two sooty-brown stripes on each side of the head and neck extending down to the back: ear-coverts greyish-brown; remainder of upper plumage olive-brown tinged with grey on the back; exposed portions of the wings and tail yellowish-brown; throat whitish, underparts ochraceous buff. Type from Karennee is in the British Museum.

Wing measurement of 6 males; average 71 mm. or 2.8", max., 73 mm. or 2.85", min., 69 mm. or 2.67". Female, 70 mm. or 2.7". Culmen, 13 mm.

Distribution.—Most probably Siam, S. S. States, Karennee, and S.-E. Burma to just north of Moulmein.

Hume, Stray Feathers, iii., p. 116. "*Birds from Pegu.*"

"... but in one respect it more closely resembles *nepalensis*, a point which appears to have been overlooked, in that it exhibits the same sort of dark streaks running backwards on either side of the nape that *nepalensis* does, only in *phayrei* it is less strongly marked."

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ALCIPPE PHÆOCEPHALA DAVISONI, sp. nov.

The Tenasserim Quaker-Thrush.

Similar to *A. magnirostris*, from Karennee, but the stripes on the head are entirely wanting or only very faint indications of them; also very similar to *A. brucei* from Western India, but is much darker.

Description.—Head and neck ashy brown well defined from the back; stripes on head wanting or only faint indications; ear-coverts hair-brown; chin and throat whitish; under parts ochraceous, flanks olivaceous.

Wing measurement: males, average 71 mm. or 2·8", max., 73 mm. or 2·85," min., 68 mm. or 2·68." Female, 70 mm. or 2·7." Bill, upper mandible horn, lower yellowish. Culmen, 13 to 14 mm. or "Iris slaty-grey to slaty-yellow."

Hume, Str. Frs., vi., p. 260 "*Birds of Tenasserim.*"

In pointing out the differences between *A. phayrei* and *nepalensis*, says, "*Phayrei* may be distinguished at once from *nepalensis* by its larger size, much larger bill, browner ear-coverts, and by the almost entire want in most specimens, and the comparatively feeble trace in the rest, of the very conspicuous black sinocipital stripes which characterize *nepalensis*."

Distribution.—Tavoy, Mergui and to the south, the dividing line between this sub-species and *magnirostris* is about the latitude of Moulmein, birds to the south of this show very little signs of any stripes on the head, and further south none whatever.

Habits.—Occurs throughout the province, only in the low hills.

Nests within a few feet of the ground at low elevations, eggs in the Museum (*phayrei* from Tenasserim) are pinkish-white, blotched and streaked with reddish-pink, and with faint spots of purple. Measuring '68" to '78" by '53" to '59".

(To be continued.)

A REVIEW OF THE INDIAN SWANS.

BY

E. C. STUART BAKER, F.Z.S., F.L.S. AND M.B.O.U.

(With a Plate.)

In 1897 when writing a series of articles on "Indian Ducks and their Allies," it was very doubtful what species of swans had been obtained in India, but I then accepted records of *Cygnus musicus*, *C. bewicki* and *C. olor*. Of these, however, the second had to be eliminated as Blanford showed that the head and feet, hitherto supposed to have belonged to this species, were really those of *musicus*. Ten years later, in 1908, when these articles to which I refer, appeared in book form, there were therefore only two species of swans, *i.e.*, *musicus* and *olor*, the Whooper and the Mute Swan, which had been authenticated as having occurred in India. Since then a great deal more information has been obtained on the occurrence of swans in that country and, in addition to this, Alpheraky has described a new Eastern form under the name *jankowskii*; it seems, therefore, desirable to again examine the question of what swans have occurred in India and at the same time it may be useful to summarise all information up-to-date and give a key to the species. The correct name for *Cygnus musicus* is *Cygnus cygnus*, and will be used hereafter in this article.

Key to the Species.

- A.—Lores and triangular patch between forehead and gape yellow or orange yellow, never black. No knob at base of bill.
- a. Yellow on bill extending right up to the nostril and sometimes still further towards tip of bill ... *cygnus*.
 - b. Yellow never reaching to nostril and generally confined to somewhat circular patch on base.
 - a. Bill longer, broader but less high at the base in comparison. Serrations on bill hardly visible when closed. *jankowskii*.
 - b. Bill shorter, not so broad but comparatively high at base. Serrations visible along whole length of bill when closed ... *bewicki*.
- B.—Lores and triangular patch black. A knob at base of bill in adults... *olor*.



(Half Nat. size.)

1. BEWICK'S SWAN. *C. bewicki*.
2. ALPHERAKY'S SWAN. *C. jankowskii*.
3. THE WHOOPER. *C. cygnus*.
4. THE MUTE SWAN. *C. olor*.

CYGNUS CYGNUS (Linn.).

The Whooper.

Anas cygnus.—Linn. Syst. Nat. 1, p. 122 (1758); *ibid*, 1, p. 194 (1766); Lath. Ind. Orn. ii, p. 893 (1790).

Cygnus ferus.—Briss. Orn. vi, p. 292; pl. xxviii (1760); *Cygnus musicus*, Bechstein, Gem. naturg. Vög. Deutschl. iii, p. 830, pl. 35 (1809); G. R. Gray, Cat. Mamm. etc. Coll. Hodgs. 1846, p. 144; Brooks, P. A. S. B., 1872, p. 63; Hume, Str. Feath. vii, pp. 106, 107, 464; viii, p. 114; *id.* Cat. No. 944 quat. Hume & Marsh. Game B. Ind. iii, p. 47. Plate (1880); Salvadori, Cat. B. M. xxvii, p. 27 (1895); Stuart Baker, J. B. N. H. S. xl, p. ii (1897); Blanford, *ibid*, p. 306 (1898); Aitken, *ibid*, xiii, p. 362; Crerar, *ibid*, xv, p. 716 (1903); Cumming, *ibid*, xvi, p. 697; Makin, Ibis, 1906, p. 398; Annandale, *ibid*, p. 612; Buturlin, *ibid*, p. 737; Thomson, *ibid*, 1907, p. 511; Buturlin, *ibid*, p. 651; Stuart Baker: "Indian Ducks and their Allies," p. 12 (1908); *id.* J. B. N. H. S. xviii, p. 754 (1908); *id.* *ibid*, xxi, p. 274 (1911).

Cygnus bewicki.—Hume & Marsh. Game B. Ind. iii, p. 51 (in err.) (1880); Stuart Baker, J. B. N. H. S. xi, p. 14 (in err.) (1897); Salvadori, Cat. B. M. xxvii, p. 29 (1895); (part specimen "M.")

Cygnus cygnus.—Sharpe Hand.-L. 1. p. 207.

Description.—*Cygnus cygnus* can be discriminated from the other swans which have yellow lores by its much greater size when adult, the wing being never under 22.5" (570 mm.) and generally a good deal more. The bill is not only actually, but is also comparatively longer in adult birds, being very seldom as little as 3.9" (100 mm.) and generally well over 4" (102 mm.). In shape also it differs greatly, the upper outline running almost straight from the tip to the base at forehead, which is, comparatively, not nearly so deep as in *bewicki*. In colouration the yellow on the base of the bill in the "Whooper" extends right down to the upper corner of the nostril and open beyond this; the outline between the yellow and black is generally very ragged, the colours running into one another though not fusing into an intermediate tint.

The serrations in the upper mandible in the closed bill are not visible when looked at from one side.

Occurrences in India.—(1) Head and feet now in the British Museum; obtained in Nepal by Hodgson, 1829. (2) Head and feet in the Bombay Natural History Society's Museum, shot by General Osborn on the Beas River, Punjab, 6th January 1900. (3) A skin in the same Museum presented by Mr. J. Crerar and shot by him in Larkhana District, Sind, on the 31st January 1904. (4 & 5) Two heads in the Bombay Museum presented by Col. Magrath and

shot by Mr. M. Donlea out of a herd of seven, on the 10th December 1910, near Dera Momim, on the Kabul River.

Distribution.—The whole of Northern Europe and Africa extending to Japan and Greenland. Buturlin gives its most Northern breeding range as Verkhore-Kolymsk, $65^{\circ} 4\frac{1}{2}'$ N., South, it extends in Winter to Southern Europe, Asia Minor, Persia, India and China.

CYGNUS BEWICKI.

Bewick's Swan.

Cygnus bewicki.—Yarrel, Trans. Linn. Sec. xvi, p. 453 (1830); Hume, Str. Feath. vii, pp. 107 & 464 (1878); Hume & Marsh. Game-B. iii, p. 51 (part) plate (1880); Salvadori, Cat. B. M. xxvii, p. 291 (1895); Stuart Baker, Jour. B. N. H. S. xi, p. 14 (1897); Blandford, *ibid*, p. 306; Sharpe, Hand.-L. 1. p. 207 (1899); Buturlin, Ibis 1907, p. 651; Stuart Baker: "Indian Ducks and their Allies" p. 12, 1908, *id*, J. B. H. N. S. xviii, p. 754—8 (1908); *id*, *ibid*, xxi, p. 273.

Cygnus minor.—Keyserling & Blasius, Werbelthière, pp. 6, xxxii and 222 (1840); Stuart Baker, J. B. N. H. S. xi, pl. i. (1897).

Description.—Of the swans with the yellow lores, Bewick's Swan is the smallest, seldom having a wing exceeding 21", indeed Buturlin gives the greatest measurement of any bird measured by him as 20" (520 mm.). The bill is strikingly shorter than that of *cygnus*, being seldom, if ever, over 3.75" (94.2 mm.) but is, on the other hand, comparatively much deeper at the base measuring up to 1.72" (43.6 mm.), the diminution in depth, from forehead to tip, is also much more abrupt, so that the upper outline presents a concave appearance. The serrations on the upper mandible in the closed bill are visible over about two-thirds the total length of the bill. In colouration the yellow is restricted to a portion of the base above, and never touching the nostril and is nearly always well defined from the black in a clean, curved line enclosing the higher extremity of the hollow in which the nostril is placed and thence extending back along the margin of the upper bill to the gape. The feet also are much smaller, the tarsus generally being less than 3.80" (96.5 mm.), whereas in *musicus* it is generally over 4.2" (106.7 mm.) and Buturlin gives the smallest of his series of the latter bird as 4.4" (115 mm.).

Occurrences in India.—(1) Skin now in Bombay Natural History Society's Museum obtained by Mr. B. L. McCulloch of the Indian Police at Jacobabad in Sind, on the 2nd December 1907. (2) A skin of a female in the same Museum shot by Major P. C. Elliot-Lockhart near Mardan, on the N.-W. Frontier, on the 30th December 1910.

Distribution.—Over Northern Europe and Asia as far East as the Lena Delta, extending in some numbers as far West as Great Britain. In winter it extends South into Central Europe and South Russia as far as the Caspian and in Asia as far South as Persia, Northern India and Central West China. The records of its appearance in South-East China and Japan probably generally refer to the next bird, *jankowskii*.

CYGNUS JANKOWSKII.

Alpheraky's Swan.

Cygnus bewicki jankowskii, Alpheraky—Priodai Okhata (Nature and Sport), Russia, September 10th, 1904.

Cygnus jankowskii, Buturlin, Ibis, 1907, p. 651.

Description.—Buturlin (*in loc cit*) writes: "It is altogether larger than *C. bewicki*, while the yellow of the bill is somewhat more developed, but the best diagnostic character is its much broader bill. Fully adult examples of *C. bewicki* have the maximum breadth of the bill 28—30·5mm., exceptionally reaching to 31mm., but then this specimen has the bill from the eye 122mm. long."

The breadth of the bill is a good character generally but, as a matter of fact, the type of *bewicki* in the British Museum has the bill at its broadest part no less than 32mm. wide and another bird obtained by Yarrel at the same time has it 31·7mm. As will be seen, however, from Gronvold's excellent plate the shape of the bill is different to that of *bewicki* although the distribution of colour is the same. The upper margin of the bill in *jankowskii* is almost as straight as it is in *Cygnus cygnus* and does not show a concave line as in *bewicki*, the bill is also much longer in proportion to the depth and the serrations in the closed bill show for three or four of their number. The yellow also appears to be considerably darker and more orange in tint than it is in either *cygnus* or *bewicki*. In the only specimens I have seen it is also noticeable that the black runs as a narrow line round the forehead.

Alpheraky treats this swan as a sub-species of *Bewick's Swan*, but I see no reason why we should not give it full rank as a species. Buturlin obtained a large series and in the Lena Delta the two birds were actually breeding in the same area, yet here they acquire not an intermediate form as we should expect, but are all individually referable to either Alpheraky's or Bewick's Swans. Nor does Buturlin say anything to show that he found individuals of the two forms pairing together.

Undoubtedly some large *bewicki* are as big as small *jankowskii*, but even these appear to be distinctly referable in other respects to one or the other form.

Occurrences in India.—(1) A skin in the Bombay Natural History Society's Museum shot by Mr. Hornsby, on the 2nd January

1911, at Tubi, Campbellpur. The orange tint in the bill of this bird was very distinct when first seen by me in August in 1911.

Distribution.—"Breeds in the tundras of Eastern Siberia from the Lena Delta eastward." "During migration it is met with as far West as Dzungaria" (Buturlin.) It extends South during winter into Central Asia and, as above, into India and China, whence I have seen a skin collected by LaTouche. Probably the majority of reported occurrences of *bewicki* in China and Japan should refer to this species. A swan seen by Major Harington near Maymyo, in the Shan States, *may* have been of this species.

CYGNUS OLOR.

The Mute Swan.

Anas olor—Gmel. Syst. Nat. 1, pt. 2, p. 502 (1788); Latham, Ind. Orn. ii, p. 834 (1790).

Cygnus olor.—Vicill. Nouv. Dict. d'Hist Nat. ix, p. 37 (1817); *Scully, Stray Feath. iv, p. 197 (1876); Blanford, Stray Feath. vii, pp. 99, 100, 101 (1878), Hume, Stray Feath. vii, pp. 101, 106 (1878); *id.*, Proc. As. Soc. Beng. (1878), p. 138; Hume and Marshall, Game B. Ind. iii, p. 41, plate (1880); Salvadori, Cat. Birds B. M. xxvii, p. 35 (1895); Stuart Baker, J. B. N. H. Soc. xi, p. 16, plate (1897); Sharpe, Handl-L. 1. p. 209 (1899), Cumming, J. B. N. H. Soc. xvi, p. 697.

Cygnus unwinii.—Hume, Ibis 1871, p. 413; Blanford, Stray Feath. vii, p. 100 (1878); Hume, Stray Feath. vii, p. 104 (1878).

Cygnus sibilus. Hume, Stray Feath. vii, p. 105 (1878).

Cygnus altumii.—Homeyer, Hume, Stray Feath. vii, p. 105 (1878).

Cygnus sp. Blanford, Stray Feath. vii, p. 100 (1878); Hume, Stray Feath. vii, p. 104 (1878).

Description.—When adult this swan can always be distinguished at a glance by the knob at the base of the bill, but at all ages it can be determined by the black lores.

Occurrences in India.—(1) Skin in British Museum, shot by W. Mahomed Umar, January 1857, in the Shah Alum River, Punjab. (2) Two young birds shot by Captain Unwin on the Jubee Stream, North-West Provinces, January 1871. Skins in the British Museum. (3) Three birds, the skin of one of which is in the British Museum, shot by Mr. E. H. Watson in the Sewan District of Sind, on the 12th February 1878. The same year many more were seen and in five cases a pair were shot, but no skins preserved. In June of the same year out of a flock of these birds, one was shot by Major Waterfield and one by Mr. D. B. Sinclair, and on the 7th July the latter gentleman saw another swan in the Gulabad Jheel,

* "I am not certain that I have correctly identified the species. No specimen was preserved.—J. S."

near Peshawar. (4) In 1900 Mr. Jones of the Indo-European Telegraph Co. shot two swans out of a herd of nine on January 10th. (5) In the Karachi Museum there is the skin of a bird, which was captured by Mr. Cumming, platelayer, after it had injured itself against a telegraph wire. This was on the 13th January 1900 and the bird formed one of a flock of eight. (6) Two swans were captured in nets by natives on the 6th February 1900 at Sita Road station. (7) At Boston on the Baluchistan Frontier four swans were shot by a Mr. Matthews, platelayer, early in February 1900. (8) In the same year Mr. J. Crerar, I.C.S., shot one about the middle of March on the Manchur Lake, Sind. (9) At the end of March the same year ten swans were seen and repeatedly fired at by Mr. Vivien on the Laki Lake. (10) On the 27th April 1900 a swan was shot by Mr. Wragge, platelayer, at Metong, about 12 miles from the Indus. (11) In the same year Major-General Egerton saw a herd of swans at Kandian on the Indus. (12) In the end of March 1910 Capt. H. O'Brien obtained one at Nowshera. (13) Mr. P. Lord shot one on the R. Sohan, Punjab, on 26th January 1911. (14) In 1911, on 6th February, Mr. L. C. Glascock shot one near Lahore.

Distribution.—"Denmark and South Sweden, South Russia, valley of the Danube, Transylvania and Greece, and passing the Northern Shores of the Caspian to Turkestan and Mongolia, wanders in the Southern portions of the Caspian occasionally in the extreme North-West of India and in the Basin of the Mediterranean" (Salvadori).

BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA, BURMA AND CEYLON.

REPORT No. 16.

BY R. C. WROUGHTON.

COLLECTION	...	...	No. 16.
LOCALITY	...	...	Dry Zone, Central Burma and Mt. Popa.
DATE	...	...	July-October 1913.
COLLECTED BY	...	...	Mr. G. C. Shortridge.
EARLIER REPORTS...	...	...	No. 1, E. Khandesh, Vol. XXI, p. 392, 1912; No. 2, Berars, Vol. XXI, p. 820, 1912; No. 3, Cutch, Vol. XXI, p. 826, 1912; No. 4, Nimar, Vol. XXI, p. 944, 1912; No. 5, Dharwar, Vol. XXI, p. 1170, 1912; No. 6, Kanara, Vol. XXII, p. 29, 1913; No. 7, Central Provinces, Vol. XXII, p. 45, 1913; No. 8, Bellary, Vol. XXII, p. 58, 1913; No. 9, Mysore, Vol. XXII, p. 283, 1913; No. 10, Kathiawar, Vol. XXII, p. 464, 1913; No. 11, Coorg, Vol. XXII, p. 486, 1913; No. 12, Palampur, Vol. XXII, p. 684, 1913; No. 13, South Ceylon, Vol. XXII, p. 700, 1913; No. 14, Shan States, Vol. XXII, p. 710, 1913; No. 15, Kumaon, Vol. XXII, p. 282, 1914.

This collection represents the Fauna of the Dry Zone of Upper Burma, and the local Fauna of Mt. Popa. This Dry Zone is represented roughly by the Districts of Shwebo, Lower Chindwin, Mandalay, Pakokku, Myingyan, Sagaing, Kyaukse, Meiktila, Minbu, Magwe and Yamethin. It covers about 35,000 square miles, and occupies the whole basin of the Irrawady, between the Arakan Yomas and Chin Hills on the West and the Shan Hills on the East, from about 20° to 23° North Latitude.

The whole of this area may be classed as 'plain country,' with a scanty rainfall of about 25 inches, except on its outer edges where the climatic conditions are modified by the surrounding hilly country. The thermometer ranges from 105° in May to 55° in December. With the exception of the neighbourhood and slopes of Mt. Popa, the jungle consists almost entirely of dry scrub growth, the only tree of any value being the *Acacia catechu*, yielding the 'cutch' of commerce. Mt. Popa is an isolated volcanic peak, rising abruptly from the surrounding plain, in the middle of the Dry Zone. It reaches a height of close on 5,000 feet and as was to be expected the climatic conditions are considerably modified on its wooded slopes.

The following notes on the camps visited are furnished by Mr. Shortridge:—

Mandalay City.—Population 183,816. The Head-quarters of the District and Division of the same name. Situated on the East bank of the Irrawady, about 21° 50' North and 96° 6' East. The

Capital of the old Kingdom of Burma between 1856 and 1885. The old City, now known as Fort Dufferin, forms part of the Cantonment. With the exception of Mandalay Hill, the country is flat. The trees round the City, which have been planted, consist of Tamarinds, Mangoes, Figs and other shade trees.

Mingun, a village containing many ruins, on the West bank of the Irrawady, about 11 miles above Mandalay, in the Sagaing District. Along the bank of the river is a narrow populated strip of flat country, thickly studded with Tamarinds, Mango and Fig Trees, Coconut Palms and Plantain Gardens. Behind this is a range of hills rising to above 1,000 feet covered with thick low scrub.

Kyauk Myoung, on the West bank of the Irrawady, in Shwebo District, about 45 miles above Mandalay. The rainfall is rather heavier here than round Mandalay and the typical scrub is higher and thicker. The banks rise slightly from the river, but there are no hills, the whole country being flat or undulating and largely under rice cultivation. A few Hog Deer and Thamin are said to occur in the neighbourhood. Blanford notes that this place was visited by Fea.

Ngapyinin, a small village, exactly opposite the last, on the East bank of the river. The country differs from that on the West bank in being more hilly and broken. The jungle also is much higher and contains patches of bamboos. Except along the bank of the river there is no cultivation. Tsaine and Porcupines were observed in the district.

Mount Popa.—An extinct volcano, 4,962 feet in height, rising abruptly out of the plain and surrounded by dry, open country for at least 50 miles in every direction. Situated in $20^{\circ} 56'$ North by $95^{\circ} 16'$ East, in Myingyan District, in the centre of one of the most arid parts of the Dry Zone. The mountain is more or less conical, its summit being covered with grass. The upper slopes and inside of the Crater clothed partly with temperate evergreen Forest, and partly with Gardens, which are replaced on the lower slopes by dry deciduous forest mixed with bamboos. On account of its height Mt. Popa catches a heavy rainfall, so that the Climate and Vegetation are quite distinct from those of the surrounding country. According to the Gazetteer (1908) barely 50 years have elapsed since Elephants, Rhinoceros, Sambhar and Tigers occurred in the Forests of Mount Popa, but they have now entirely disappeared. Serow have been shot more recently, but the local villagers state that none have been seen for some years. In the evergreen forests on the higher slopes the trees are covered with thick moss, ferns and orchids, while in places the ground is carpeted with bracken and masses of pink and white balsam, over which were seen hovering numbers of black and yellow *Ornithoptera*. The principal

crops grown on Popa are Indian corn, plantains, sweet potatoes, custard apples, guavas, rice and sesamum, the two last chiefly on Popamyo plateau, on which the village of the same name is situated at between 2,000 and 3,000 feet altitude, the descent to the plains from this point being steep and precipitous.

Pagan, an ancient ruined City, the Capital of the Burmese Empire, about the years 750-1280 A.D. Situated at $21^{\circ} 10'$ North by $94^{\circ} 53'$ East on the left bank of the Irrawady, towards the South-West of the Myingyan District. The most noticeable feature is the thousands of Temples and Pagodas, most of which are in ruins, and which afford shelter for countless numbers of Bats. It is situated in one of the driest and most barren parts of the dry belt. The chief vegetation is low prickly scrub cactus and milk bush, with a few Tamarinds and Acacias dotted here and there. The district is said to be more dry and arid than formerly, owing to its denudation of trees. The country round is almost flat, with the exception of the Taywindaing range of hills, which rise about 10 miles inland and stretch in a south-easterly direction, forming a short, narrow line of rocky peaks, some of which rise to a height of over 1,000 feet. The ground is very poor, the chief crops grown locally being early sesamum, ground-nuts, pulse and jowar.

The Collection contains 1,090 specimens, but of these, 32, contributed by local Members of the Society, are from the Shan States, or other areas beyond the scope of this Report, and I have dealt with them in an appendix. The remaining 1,059 specimens belong to 53 species in 38 Genera.

The most notable fact in connection with the Collection is the discovery of the two new species, *viz.*, *Millardia kathleence*, Thos., and *Leggadilla shortridgei*, Thos. So far as I am aware neither of these Genera have before been found East of Assam. Besides these there are more than 20 forms whose names appear for the first time in the records of the Survey.

Ratufa gigantea was described from Assam. The National Collection contains specimens from Siam, and even as far south as Hainan, and quite recently has received specimens from Myitkyina (Capt. A. W. Kemmis, 1908), Katha (Col. C. E. Nichol, 1911,) Madaya Forest, 55 miles N. of Mandalay (C. S. Barton, 1914), and finally it has been recorded by Miss Ryley in the Shan States Report (No. 14) as occurring there. On the other hand *Ratufa melanopepla* has been recorded from some of the islands of the Malay Archipelago, from the whole of the Malay Peninsula and from Tenasserim, and here we have it from Mt. Popa. The distribution of these two species throughout their habitats is thus sketched out and there is little doubt that our Upper Chindwin and Pegu Collections will support this view.

There is a somewhat similar problem in connection with *Lepus peguensis* and *Lepus siamensis*, but unfortunately there is a link missing. This Collection shows that *peguensis* occupies the Valley of the Irrawady up to at least 22°, and this is confirmed by some specimens in the Natural History Museum collected by Maj. H. Harington "N. of Mandalay." No hare is, I believe, known south of Rangoon. As mentioned further on, Major Harington collected, "near Bhamo," a series which is closely allied to, if not identical with *siamensis*. Unfortunately the Shan State Collection contained no hares. Will some local members help in this matter by sending some of the Northern and Southern Shan States hare or hares?

On the whole there does not appear to be so much difference between the Fauna of Popa and that of the surrounding country as might have been expected. The closest affinity of this mountain Fauna seems to be with that of the Shan States. The *Tupaia*, *Sciuropterus*, *Menetes* are all identical with those found in the Shan States, and each of them is a local variation of a southern Pegu form. We have nothing among the specimens from the plain country with which to compare them, which is natural enough in view of the absence of suitable forest except on Popa. It is true that *Sciurus ferrugineus* is essentially a Pegu species, but it is also found in the Shan States (see Appendix). The large majority of the Bats included in the Collection are from the plains, but this is due to the ruined Pagodas of Mingun and Pagan, and not to the effect of climatic conditions. It may however be noted that all the *Scotophilus kuhli* are from Popa, while all the *Scotophilus wroughtoni* are from the plains, they have however, in former collections, so often been received together from the same place that but little importance can be attached to their present separation, any more than to the curious monopoly enjoyed by Mandalay in *Rhinolophus fulvus* and by Ngapyinin in *Sciurus phayrei*.

Specimens received from members as follows:—

Sagaing District	...	Major F. C. Owens.
Magwe District	...	J. P. Cook.
Lower Chindwin	...	G. W. Dawson, I.C.S. and S. F. Hopwood, I.F.S.
Pyawbwe	...	Capt. F. E. W. Venning.
Pyinmana	...	C. B. Moggridge.
Pakokku	...	Major C. E. Bowen.
Mandalay	...	Capt. S. Pershouse.

are included in the main report, while the following:—

N. Shan States	...	J. P. Cook.
S. Shan States	...	Capt. F. E. W. Venning and J. P. Cook.
Myitkyina District	...	Capt. F. E. W. Venning.
Maymyo	...	G. B. H. Fell, C.I.E., I.C.S. and J. P. Cook.

Chin Hills ...	...	S. F. Hopwood, I.F.S. and Capt. W. J. Massy.
Thayetmyo...	...	F. B. Leach, I.C.S.
Thaton ...	...	R. V. Littlewood.

are dealt with in the Appendix.

The detail in which the Survey is now being carried out is, I believe, already a strain on the finances available, and any more 'intense' collecting is quite out of the question; it is clear therefore, if the results of the Surveys are to be supplemented, and linked up, it can only be done by the exertions of local residents. I venture to offer the above-named gentlemen my best thanks, and to express a hope that they will continue to take an interest in the Mammal Fauna around them and to help forward the study of them.

PITHECUS ASSAMENSIS, Mc. Cl.

The Himalayan Monkey.

1839. *Macacus assamensis*, Mc. Clelland, P. Z. S., p. 148.
 1840. *Macacus (Pitheu) pelops*, Hodgson, J. A. S. B., IX., p. 1213.
 1888. *Macacus assamensis*, Blanford, Mammalia, No. 4.
 ♂ 1. Mingun.
 ♀ 5. Mt. Popa.

"Plentiful on Mt. Popa. Occurring in the Dry zone on both sides of the Irrawady, but apparently rare away from jungle or hills. Though a typical Macaque in its habits, and occasionally to be found around village gardens and crops, this species does not seem to have become semi-tame in habits like *rhesus* and *sinicus* of India. The species seen by Anderson near Yenangyaung, on the Irrawady, about 30 miles to the south of Popa, was undoubtedly this species. Bare skin on face of all specimens obtained dusky, never red."—G.C.S.

Vernacular names—MYARK (Burmese), LING-KUN-LENG or LINGIHKUNG (Shan).

PRESBYTIS, sp.

There is a single specimen of Langur, collected by Mr. G. W. Dawson, included in this collection. The skull is missing. The animal was obtained in Yin, Lower Chindwin. Our collection from Chindwin may later enable a name to be put on this specimen at present I prefer to leave it unnamed.

PRESBYTIS PHAYREI, Blyth.

Phayre's Leaf Monkey.

(Synonymy in No. 14.)

♂ 3, ♀ 3. Mt. Popa.

(The specimens and remarks under this species in Report No. 14 are referable to the next species.)

"Fairly plentiful on the higher slopes of Mt. Popa, which is, without doubt on account of the physical conditions of the country, the northern limit of the range of this species to the east of the Irrawady, further north and on the Shan Hills it is replaced by *P. barbei*, further south the watershed of the Sitang River probably divides the two species. The Burmese Leaf Monkeys differ in many of their habits from the Indian Langurs, they

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are less noisy and conspicuous and rarely frequent cultivated districts, being almost exclusively forest dwellers"—G.C.S.

Vernacular names—MYAUK-HGENYO or MYAUK-MYET-KWIN-BYU (Burmese).

* PRESBYTIS BARBEI, Blyth.

Barbes Leaf Monkey.

1847. *Presbytis barbei*, Blyth., J. A. S. B., XVI., p. 734.

1888. *Semnopithecus barbei*, Blanford, Mammalia, No. 22.

♂ 1, ♀ 1. Kyouk Myoung.

"Fairly plentiful around Ngapyinin, opposite Kyouk Myoung, probably wanderers from the Shan Plateau, which is not far from the river at this point. It will probably not be found on the Irrawady below Mandalay, where the country becomes too open, though how far south *barbei* extends in the Shan States still remains to be shown. Though superficially very like *phayrei*, the hair on the crown is not directed backwards but radiates from a point above the forehead. There is no crest. In life the triangular pale patch round the mouth is present in both species, but the actual white hairs are more conspicuous in *barbei*. The pale ring round the eye in *phayrei* is almost white, giving the appearance of a pair of spectacles, while in *barbei* this ring only extends over a semicircle on the inner side of the eye; the distinction is lost in dried specimens."—G.C.S.

Vernacular names—MYAUK-HGENYO or MYAUK-MYET-KWIN-BYU (Burmese), LING-KANG or LING-MUN (Shan.)

ROUSETTUS LESCHENAULTI, Desm.

The fulvous Fruit Bat.

(Synonymy in No. 11.)

♂ 1. Mingun.

♂ 11, ♀ 20. Pagan.

(See also Reports Nos. 11 and 15.)

"A large colony was found in an old Pagoda at Pagan, where they roosted in company with *Taphozous kachhensis*. This animal differs from *Cynopterus sphinx* in being a cave or temple dweller, while the latter is generally found in the heads of Palm trees, though occasionally found under the eaves of houses."—G.C.S.

Vernacular names—LINZWAI (Burmese also used for the Flying Fox.)

CYNOPTERUS SPHINX, Vahl.

The Southern short-nosed Fruit Bat.

(Synonymy in No. 6.)

♂ 1, ♀ 2. Mingun.

♀ 1. Mt. Popa.

♂ 3, ♀ 3. Pagan.

(See also Reports Nos. 6, 9, 11, 13, 14 and 15.)

"These Bats were observed in very large numbers around Mandalay, during the Mango season. It was found at Pagan, as usual, in the crowns of Toddy Palms and at Mingun both in Palms and under the eaves of Verandahs."—G.C.S.

Vernacular name—LINZWAI (Burmese).

* The specimens from the N. Shan States (Report No. 14) were in error referred to *phayrei* instead of *barbei*.

RHINOLOPHUS LEPIDUS, Blyth.

The little Indian Horse-Shoe Bat.

(Synonymy in No. 6.)

♂ 10, ♀ 31, in al. 12. Pagan.

(See also Reports Nos. 6, 7 and 15.)

"Some very large colonies of this Bat were found at Pagan roosting inside Pagodas and caves".—G.C.S.

Vernacular name—LINHNO or LINNO (Burmese for all insectivorous Bats).

HIPPOSIDEROS LARVATUS, Horsf.

Horsfield's leaf-nosed Bat.

(Synonymy in No. 14.)

♂ 6, ♀ 8. Mingun.

♂ 2, ♀ 2. Kayouk Myoung.

♂ 4. Mt. Popa.

♂ 8. Pagan.

1 (no skull) Yin, L. Chindwin. (Collected by G. W. Dawson, I.C.S.)

(See also Report No. 14.)

"Existing often in enormous numbers throughout the Dry Zone, where they roost in Pagodas and caves."—G.C.S.

HIPPOSIDEROS FULVUS, Gray.

The bi-coloured leaf-nosed Bat.

(Synonymy in No. 3.)

♂ 13, ♀ 11, in al. 8. Mandalay.

♂ 4, ♀ 3, in al. 2. Mingun.

♂ 1, ♀ 1. Mt. Popa.

♂ 2, ♀ 6, in al. 4. Pagan.

(See also all former Reports except Nos. 1, 2, 4, 11 and 15.)

"Very plentiful. Twice found resting in Porcupine burrows."—G.C.S.

MEGADERMA SPASMA TRIFOLIUM, Geoff.

The Malay Vampire Bat.

(Synonymy in No. 5.)

♂ 1, ♀ 3. Kyouk Myoung.

(See also Reports Nos. 5, 6 and 11.)

"Apparently rare. A small colony found roosting in an old Pagoda."—G.C.S.

PIPISTRELLUS MIMUS, Wrought.

The Southern Dwarf Pipistrelle.

(Synonymy in No. 1.)

♂ 2. Mandalay.

♀ 1. Mt. Popa.

(See also all former Reports except Nos. 4 and 14.)

PIPISTRELLUS, sp.

♂ 1. Kyouk Myoung.

Mr. Thomas, who has examined this specimen, informs me that it differs from the others, which I have classed as *minus*, "by its unicuspid inner upper incisors and slightly larger brain case, but in so difficult a group I do not venture to describe it without examining further material."

SCOTOPHILUS KUHLI, Leach.

The Common Yellow Bat.

(Synonymy in No. 1.)

♂ 1, ♀ 4, 1. Mandalay.

♂ 2, ♀ 1. Kyouk Myoung.

♂ 4, ♀ 10. Mt. Popa.

(See also Reports Nos. 1, 3, 5, 6, 7, 9, 12, 14 and 15.)

"Very plentiful every where—roosting in Caves, Temples, and occasionally the hollow branches of trees."—G.C.S.

SCOTOPHILUS WROUGHTONI, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

♂ 8, ♀ 16. Mingun.

♂ 5, ♀ 3. Pagan.

♂ 1. Mandalay.

1 (no skull) Ngazun, Sagaing. (Collected by Maj. F. C. Owens.)

(See also Reports Nos. 1, 5, 6, 7, 9, 10, 11, 12 and 15.)

"Plentiful but not quite so widely distributed as *kuhli*. The colonies when found are very large in old Pagodas, but they are occasionally found in rather smaller numbers hiding in the crowns of Palm trees."—G.C.S.

MINIOPTERUS FULIGINOSUS, Hodgs.

Hodgson's long-winged Bat.

(Synonymy in No. 15.)

♂ 1. Mingun.

(See also Report No. 15.)

"A single specimen obtained inside a Pagoda at Mingun. I could not ascertain if this species was plentiful as *Miniopterus* is very difficult to identify on the wing."—G.C.S.

TAPHOZUS KACHHENSIS, Dobs.

The Cutch sheath-tailed Bat.

(Synonymy in No. 1.)

♂ 11, ♀ 14. Pagan.

(See also Reports Nos. 1, 3, 8, 9, 10 and 12.)

"Numerous colonies were found inside old Pagodas at Pagan. The gular sac is present in both sexes of this species, though more fully developed in the males, which latter, like those of *longimanus* and *saccolomus*, have a circular gland below the sac."—G.C.S.

TAPHOZOUS LONGIMANUS, Hardw.

The long-armed sheath-tailed Bat.

(Synonymy in No. 7.)

♂ 1. Mandalay.

♂ 8, ♀ 16. Pagan.

(See also Reports Nos. 6, 7, 8, 9 and 12.)

"Very plentiful in Pagodas at Pagan."—G.C.S.

TAPHOZOUS MELANOPOGON, Temm.

The black-bearded sheath-tailed Bat.

(Synonymy in No. 1.)

♂ 22. Mingun.

♂ 14, ♀ 5. Pagan.

(See also Reports Nos. 1, 2, 3, 4, 6, 7, 8 and 10.)

"Very plentiful in Pagodas at Pagan and Mingun. Like other members of the Genus, appears early on the wing and flies high. The *Emballonuridae* generally have a very offensive smell."—G.C.S.

TUPAIA BELANGERI SICCATUS, Thos.

*The Burmese tree Shrew.*1888. *Tupaia ferruginea*, Blanford, Mammalia, No. 102 (*partim*).1914. *Tupaia belangeri siccata*, Thomas, A. M. N. H., S. xiii, p. 243.

♂ 5, ♀ 3. Mingun.

♀ 2. Ngapyinin.

♂ 1. Kyouk Nyong.

♀ 2. Pyawbwe, Yamethin Dist. (Collected by Capt. F. E. W. Venning).

♂ 8, ♀ 13. Mt. Popa.

♂ 1. Pagan.

Dr. Lyon recently published a Monograph of the Tree-Shrews (Proc. U.S. Nat. Mus., Vol. 45, pp. 1—188, 1913). Still more recently Mr. Thomas took up the question of the relationship of *Tupaia belangeri* and *Tupaia chinensis*. Agreeing with Dr. Lyon, he came to the conclusion that *belangeri* and *chinensis* cannot be maintained as separate species, and the latter represents the Yunnan form of *belangeri*, which is itself a Tenasserim form. In the course of his examination, Mr. Thomas found that, while apparently distinct, the form from the Dry Zone of Upper Burma had no name and he accordingly named it "*siccatus*." The present fine series supports entirely the view taken by Mr. Thomas. The series in the Shan States collection, provisionally ranked as "*chinensis*", by Miss Ryley, belong to this species.

"Plentiful and apparently evenly distributed throughout the dry belt. Generally most numerous around villages where trees have been planted, when it may easily be mistaken for *Sciurus pygerythrus*. Although diurnal, Tree Shrews also move about a good deal in the evening and are often caught in traps set over night. In adults of both sexes there is a narrow well defined gland on the throat around which the hairs radiate. During life this gland has a slight smell of Civet, otherwise the animal has no perceptible odour."—G.C.S.

Vernacular name—SHIN-ZWI (Burmese).

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CROCIDURA FULIGINOSA, Blyth.

*Blyth's Shrew.*1856. *Sorex fuliginosus*, Blyth., J. A. S. B., XXIV, p. 362.1888. *Crocidura fuliginosa*, Blanford, Mammalia, No. 126.

♂ 1. Mt. Popa.

This is almost certainly Blyth's *fuliginosus*, with the description of which it agrees. The type of *fuliginosus* was from Pegu. This is a most valuable acquisition and will be most useful when the group comes to be worked out.

PACHYURA (?).

1. Ngazun, Sagaing. (Collected by Maj. F. C. Owens.)

A single specimen without skull. It is impossible to deal with it, it may even be an immature individual of the Common Muskrat.

FELIS PARDUS, L.

The Panther.

(Synonymy in No. 5.)

♀ 2. (1 skull only). Mt. Popa.

(See also Reports Nos. 5, 6, 9, 11, 13 and 14.)

"Plentiful on Mt. Popa, as it apparently is throughout Burma".—G.C.S.

Vernacular name—THIT or KYA-THIT (Burmese), Hso-so? (Shan).

FELIS AFFINIS, Gray.

The Jungle Cat.

(Synonymy in No. 1.)

♂ 2. Mt. Popa.

(See also all former Reports except Nos. 2, 8, 9, 13 and 14.)

"Apparently not uncommon on Mt. Popa."—G.C.S.

Vernacular name—KYAUNG-BA.

FELIS BENGALENSIS, Kerr.

The Leopard Cat.

(Synonymy in No. 11.)

1 (no skull). Pakokuk (collected by Maj. Bowen).

(See also Reports Nos. 11, 14 and 15.)

Vernacular names—THIT-GYUK (Burmese), HEN-WAP (Shan).

FELIS TEMMINCKI.

The Golden Cat.

(Synonymy in No. 14.)

♀ 1, 1, (skulls only) Pyinmana. (Collected by C. B. Moggridge).

(See Report No. 14.)

"Not heard of at Mt. Popa. Skins of above specimens seen and identified."—G.C.S.

VIVERRA MEGASPILA, Bl.

1862. *Viverra megaspila*, Blyth. J. A. S. B., XXXI. p. 331.1888. *Viverra megaspila*, Blanford. Mammalia, No. 47.

1 (no skull).—Allagappa, Sagaing. (Collected by Maj. F. C. Owens.)

Vernacular name—KYAUNG-MYENG-KWET (Burmese). HEN-HAWN or AMNGE (Shan).

In size and shape this animal is quite like *V. zibetha*, but it has a longer muzzle. It is at once distinguishable from *zibetha* however by its colour pattern, which is large dark spots on a light ground, especially on the posterior half of the body. The black rings are usually united by a black line along the upper side of the tail.

VIVERRICULA MALACCENSIS, Gmel.

The small Indian Civet.

(Synonymy in No. 3.)

1. Pakokku (Collected by Major Bowen).

♂ 1. Mt. Popa.

1. Allagappa, Sagaing. (Collected by Maj. F. C. Owens.)

(See also Reports Nos. 3, 5, 7, 10, 11, 12, 13 and 15.)

Vernacular name—KYAUNG-MYIN or KYAUNG-MYENG.

PARADOXURUS HERMAPHRODITUS, Pall.

*The Malayan Palm Civet.*1778. *Viverra hermaphrodita*, Pallas, Schr. Sang, III, p. 246.1822. *Viverra musanga*, Raffles, Trans. Linn. Soc. XIII, p. 252.1888. *Paradoxurus hermaphroditus*, Blanford, Mammalia, No. 52.

♂ 5, ♀ 2. Mt. Popa.

♂ 3, ♀ 5. Mingun.

♀ 4. L. Chindwin. (Collected by G. W. Dawson, I.C.S.)

2 (skulls only) Sagaing. (Collected by Maj. F. C. Owens.)

This species differs from '*niger*,' the common palm civet of India, in having a quite distinct marking of stripes on the back. Schwarz some time ago described (A. M. N. H., VI, p. 230, 1910) a species "*vicinus*" from Assam much resembling the present form but with the ground colour "golden yellow." Some of the younger specimens in this series show a yellowish tinge but nothing approaching golden yellow.

"Apparently plentiful throughout the Dry Zone, identical with *niger* in its habits."—G. C. S.

Vernacular name—KYAUNG-WUM-PAIK (Burmese).

CANIS INDICUS, Hodgs.

The Jackal.

(Synonymy in No. 1.)

♀ 2. Mt. Popa.

1. Magwe. (Collected by J. P. Cook.)

(See also all former Reports except Nos. 2, 8 and 13.)

"Fairly plentiful and apparently widely distributed in Burma, although not so frequently heard as in India. Well known round Mt. Popa, Mandalay, Mingun and other parts of the Dry Zone, also ascending the Shan Plateau to around Maymyo, where they used to be hunted, and extending thence, though not in large numbers, as far East as the Salween."—G. C. S.

Vernacular names—TJOUNG-KKWE or KHWE-A (Burmese).

CUON RUTILANS, Muell.

*The Malay Wild Dog.*1839. *Canis rutilans*, S. Mueller, Verhandl. Zool., p. 27.1888. *Cyon rutilans*, Blanford, Mammalia, No. 71.

♀ 1. Mt. Popa.

"This specimen, which had only 10 mammae, was run down and killed by a village dog, a thing most unlikely to occur with its larger Indian congener, although adult, it only weighed 19 lbs. This species hunts in packs like *dukhumensis*, but, owing to its small size, is much less destructive to large game, its ordinary prey is probably Barking Deer, Goats, Hares or other comparatively small animals".—G.C.S.

Vernacular names—TAW-KHWE (Burmese), MANAI (Shan).

HELICIS PERSONATA, Is. Geoff.

*The Burmese Ferret Badger.*1834. *Melogale personata*, Geoffry, Bel. Voy. Zool., p. 137.1888. *Helictis personata*, Blanford, Mammalia, No. 88 (*partim*).

♂ 1, ♀ 3. Mt. Popa.

Skull 1. Legyi, Sagaing. (Collected by Major F. C. Owens.)

The 'Ferret Badger' is a very expressive name for this animal. It is coloured uniformly brown but for the characteristic white markings on the face, and a line from the forehead to the middle of the back. The terminal portion of the tail is also white.

Blanford recognises only two species, *viz.*, *orientalis*, described from Java, and the present species, which Geoffry described from "the neighbourhood of Rangoon, in Pegu." Bonhote however who studied the genus in 1903 came to the conclusion (A. M. N. H., XII., p. 593) that there are two well marked groups in the Genus characterised by the size of the teeth, *viz.*, the large toothed western forms and the small toothed forms from Borneo, Formosa and China. In the first group he puts four species, *viz.*, *nipalensis* from India, *personata* from Pegu, *orientalis* from Java and *pieperi* from Cochin China.

"Apparently widely distributed in the dry belt but nowhere plentiful. A ferret-badger is known to occur around Maymyo, one having been killed there by hounds. Two of the specimens, although nearly full grown, were found in the same burrow with an old female which was still suckling them. Three individuals which were kept alive for a short time were not aggressively savage, and would allow themselves to be handled, though when irritated they would snap at and hang on to anything like a true badger. Although in habits this animal resembles the skunks it has no offensive smell of its own and apparently mimics no other animal here as its congener *orientalis* certainly does in Java."—G.C.S.

Vernacular name—KYAUNG-U-KYIN or KYAUNG-U-GYI (Burmese).

LUTRA MACRODUS, Gray.

The Smooth Indian Otter.

(Synonymy in No. 7.)

1 (no skull) Sagaing. (Collected by Major F. C. Owens.)

(See also Report No. 7.)

"Otters are said to be plentiful on the Upper Irrawady and Chindwin."—G.C.S.

Vernacular names—HPYAN (Burmese), MOHN (Shan).

SCIUROPTERUS PHAYREI PROBUS, THOS.

*Blyth's Flying Squirrel.*1891. *Sciuropterus sagitta*, Blanford, Mammalia, No. 235 (*partim*).1914. *Sciuropterus phayrei probus*, Thomas, Journ., B.N.H.S. Vol. XXIII.
p. 27.

♂ 20, ♀ 14. Mt. Popa.

"Very plentiful on Mt. Popa, at an altitude of about 3,000 feet. Being nocturnal and entirely arboreal and too small to be readily seen even on moonlight nights, and having no loud distinctive call, it is often very difficult to know when *Sciuropterus* occurs in a district. The present specimens were all caught by day inside hollow trees at some distance from the ground, not in dense forest but in partly cleared jungle around cultivation. They probably feed in such places, partly at least, on custard apples, guavas and other cultivated fruits."—G.C.S.

Vernacular name—SHIN-PYAN (Burmese).

BELOMYS, sp.

♂ 1. Mt. Popa.

1. Yin, Lower Chindwin. (Collected by G. W. Dawson, I.C.S.)

"One specimen was caught on Mt. Popa in the same locality as *Sc. ph. probus*; it was probably a straggler from the heavy forest higher up the mountain."—G.C.S.

RATUFA MELANOPEPLA, Mill.

*The Tenasserim Giant Squirrel.*1900. *Ratufa melanopepla*, Miller, Proc. Wash. Ac. Sc. II., p. 71.1891. *Sciurus bicolor*, Blanford, Mammalia, No. 240 (*partim*).

♂ 4, ♀ 5. Mt. Popa.

19 (no skull) Yin, L. Chindwin. (Collected by G. W. Dawson, I.C.S.)

This squirrel is very like *gigantea*, i.e., entirely black above and entirely buffy yellow below, but it is easily distinguishable at sight by the fact that *gigantea* has the upper side of the forearm black, while in *melanopepla* the yellow underside extends over the upper for a certain portion of the forearm, between the wrist and the elbow. The present series is very regular and averages considerably larger than typical *melanopepla* from Trang (just beyond the Tenasserim border). In the National Collection there are however specimens from other parts of Tenasserim which are nearly "or quite" as large as these, so it will be safer to class these as *melanopepla* until we have representatives from Pegu, &c. It is a surprise to find this species here where one would have rather expected *gigantea*.

"Local and not very plentiful on Mt. Popa, only occurring in the heavy evergreen forest near the top of the mountain."—G.C.S.

Vernacular names—SHIN-NGAPAW-ANI or SHIN-NIGYI (Burmese), MAMAI (Shan).

SCIURUS FERRUGINEUS, F. Cuv.

*The Burmese bay Squirrel.*1829. *Sciurus ferrugineus*, F. Cuvier, Mamm. pl. CCXXXVIII.1830. *Sciurus keraudreni*, Lesson, Cent. Zool. pl. 1.1891. *Sciurus ferrugineus*, Blanford, Mammalia, No. 242.

♂ 5, ♀ 6, Mt. Popa.

A squirrel a little more than eight inches long with a tail slightly longer. The whole animal is bay in colour except the feet which are black and the

tail tip which is white. These last two characters serve to distinguish it at once from the allied Siam form, *cinnamomeus*, Temminck.

This is one of a group of squirrels which varies greatly in their colouring, ranging from jet black to pure white. In a paper on the group published in 1908 (A. M. N. H., II., p. 393) I pointed out the difference (noted above) between it and *cinnamomeus* of Siam. The present series quite confirm the result I then arrived at.

"On Mt. Popa this species only occurred in the thick jungle on the higher slopes of the Mountain. Seen from a distance in a tree it appears black, the white tail tip showing up conspicuously."—G. C. S.

Vernacular names—SHIN-NGAPAW or SHIN-NI-GALE (Burma).

SCIURUS PYGERYTHRUS JANETTA, Thos.

The Irrawaddy Squirrel.

1832. *Sciurus pygerythrus*, Geoffry, Mag. Zool, Cl. 1.
 1891. *Sciurus pygerythrus*, Blanford, Mammalia, No. 248 (*partim*).
 1914. *Sciurus pygerythrus janetta*, Thomas, Journ. B.N.H.S., Vol. XXIII, p. 203.
 ♂ 5, ♀ 4. Mandalay.
 ♂ 13, ♀ 11. Mingun.
 ♂ 3, ♀ 5. Kyauk Nyoung.
 ♂ 1, ♀ 4. Pyawbwe.
 ♂ 6, ♀ 5. Mt. Popa.
 ♂ 1. Pagan.
 2. Yin, S. Chindwin. (Collected by G. W. Dawson, I.C.S.)

SCIURUS PHAYREI BLANFORDI, Blyth.

Phayre's Squirrel.

1855. *Sciurus blanfordi*, Blyth, J. A. S. B., XXXI., p. 333.
 1891. *Sciurus pygerythrus*, Blanford, Mammalia, No. 248 (*partim*).
 ♂ 10, ♀ 5. Ngapyinin.

Mr. Thomas has kindly examined this series as well as those in the Shan States Collection and the following are his conclusions.

"It would appear from this series (1) that the Upper Burma representatives of *S. phayrei* are distinguished from the typical form by their greyer and less buffy general colour, and (2) that the prominence of the dark lateral bands on the belly is influenced by season, the bands being strong in examples in fresh pelage and nearly or quite disappearing as the fur becomes worn.

Although the seasonal series is not complete round the year, there seems a strong probability that the types of *S. blanfordi*, obtained at Ava in October 1861, without any trace of stripes represent a seasonal phase of this species and I therefore use that name for them."

Will some member who has access to Ava work out this conundrum?

MENETES BERDMOREI DECORATUS, Thos.

Berdmore's Squirrel.

1891. *Sciurus berdmorei*, Blanford, Mammalia, No. 258 (*partim*).
 1914. *Menetes berdmorei decoratus*, Thomas, Journ. B. N. H. S., XXIII, p. 23. ♂ 15, ♀ 15. Mt. Popa.

A small squirrel, rather larger than the common palm squirrel, with a sharply pointed head. There are 5 distinct black stripes on the back. Between and outside the outer pair of these on each side is a white stripe.

"Occurring on Mt. Popa among rocks and stones, that are surrounded by thick scrub, and often close to cultivation, up to 4,000 feet. Very shy,

running into holes and crevices at the slightest sound or movement. It is essentially a ground squirrel, seldom, if ever, ascending trees, though by no means confining itself to open country."—G. C. S.

Vernacular name—SHIN-BAYGAYA (Mt. Popa villagers).

VANDELEURIA DUMETICOLA, Hodgs.

Hodgson's Tree Mouse.

1845. *Mus (Vandeleuria) dumeticola*, Hodgson, A. M. N. H., XV., p. 268.

1891. *Vandeleuria oleracea*, Blanford, Mammalia, No. 270 (*partim*).

♂ 1. Mt. Popa.

"Probably more plentiful than it appears to be. It is nocturnal and arboreal, and is rarely trapped."—G. C. S.

Vernacular name—NGAPYAW-CHWET. (Mt. Popa.)

EPIMYS RUFESCENS, Gray.

The Common Indian Rat.

Variety with white underparts:—

♂ 5, ♀ 2. Pagan.

♂ 12, ♀ 9. Mt. Popa.

♀ 2. Ngapyinin.

♂ 1, ♀ 1. Kyouk Nyoun.

♂ 6, ♀ 6. Mingun.

(See also Reports Nos. 5, 6, 7, 9, 10, 11, 13, 14 and 15.)

The dark bellied form, which unfortunately at the beginning of these reports I labelled as '*rufescens*,' is here apparently entirely absent, as is noted by Mr. Shortridge in sending in his Collection. True *rattus*, i.e., the English 'Black Rat,' has practically deserted Britain and is now the 'Sailor Rat,' and with the improvement of communications has spread all over the world. As we go East we seem to be getting into an area where the white bellied form is indigenous, and *rattus* a mere tourist. To me the evidence seems to be collecting that the original form of the species *rattus* was a white bellied one, and that its earliest home was in Malaya.

Vernacular names—CHWET, CHWET-WUM-BYU (Popa).

EPIMYS CONCOLOR, Blyth.

The little Burmese Rat.

1859. *Mus concolor*, Blyth, J. A. S. B., XXVIII., p. 295.

1891. *Mus concolor*, Blanford, Mammalia, No. 273.

♀ 1. Mingun.

♂ 1. Kyouk Nyoun.

♂ 23, ♀ 27, 1. Mt. Popa.

♂ 3. Pagan.

A small rat with the colouring of the common European house mouse. Its mammary formula of 2 pectoral + 2 inguinal on each side, "making 8 in all" is most characteristic.

Blanford records it from Moulmein, but not North of 20°.

"Probably distributed throughout the Dry Zone. Very plentiful in Popamyo Village, about half way up the Mountain, where it was very much more plentiful than *rufescens*, although that species occurred in normal numbers. It seems to be especially a house rat, seldom being trapped far from habitations. Not so carnivorous as *rufescens*. At Popamyo no animal matter seemed to be touched by them, though they were very

It is
y no

destructive to everything else. Very active, living largely in the roofs of houses. Said to be subject to bubonic plague equally with *rufescens*."—G. C. S.

Vernacular name—CHWET-MWE (Popa).

LEGGADILLA SHORTRIDGEI, Thos.

Burmese Spiny Mouse.

'268.

1914. *Leggadilla shortridgei*, Thomas, Journ., B.N.H.S. XXIII, p. 30.

♂ 4. Mingun.

♂ 13, ♀ 18. Mt. Popa.

♂ 2. Pagan.

and

"Very plentiful on Mt. Popa among rocks and around cultivation. Trapped at Mingun in Prickly Pear thickets."—G. C. S.

MUS MANEI, Kel.

The Common Indian House Mouse.

(Synonymy in No. 5).

♀ 1. Pagan.

(See also Reports Nos. 5, 6, 8, 9, 10, 11, 12, 13 and 14).

There is only a single specimen in this collection, so for convenience I place it under the name hitherto used for all but the specimens from Kumaon. The present specimen however differs somewhat from true *manei* in colouring, and may very well be an imported *musculus*.

"Appears to be much more local or scarce than it was on the Shan Plateau, possibly it is crowded out by *Epimys concolor*, where that species occurs."—G. C. S.

MUS NITIDULUS, Blyth.

Berdmores' Mouse.

1859. *Mus nitidulus*, Blyth., J.A.S.B., XXVIII, p. 294.

1891. *Mus nitidulus*, Blanford, Mammalia, No. 285.

♂ 1. Pagan.

♂ 9, ♀ 5. Mt. Popa.

♂ 1. Mandalay.

"Fairly plentiful on Mt. Popa in rocky country and around cultivation although out numbered by *Leggadilla* and *Mus booduga*."—G. C. S.

MUS BOODUGA, Gray.

The Southern Field Mouse.

(Synonymy in No. 1.)

♂ 29, ♀ 29. Mt. Popa.

1 (flat skin) Ngazun, Sagaing. (Collected by Maj. F. C. Owens).

(See also all former Reports except Nos. 3 and 14.)

These seem to average a shade larger in body measurement than true *booduga* from S. India, but the hind foot measurement does not show a corresponding increase.

"Swarming on Mt. Popa, especially in the cultivated lands round Popamyo. Probably widely distributed throughout the dry belt but like many of the small rodents abnormally plentiful on Mt. Popa."—G. C. S.

Vernacular name—CHWET-GALE (Popa).

GUNOMYS sp.

Thanks to specimens from Tenasserim (received later than these) I am in a position to say that these are not *G. varius*. Thos. So far as I can judge, neither are they *bengalensis*. As our knowledge of that species however is based on very imperfect material and as undoubted specimens may be expected in the Bengal Orissa Collection, I prefer, for the moment, not to give a specific name to this series. Both in skull and body proportions these are markedly larger than any *bengalensis* that I have ever seen.

♂ 2. Mingun.

♂ 8, ♀ 10, juv. 2. Mt. Popa.

♀ 1. Pagan.

"Living in burrows close to houses, &c., like other Indian Bandicoots. Plentiful in Popamyo Village and possibly in most towns and villages throughout the Dry Zone. At Mingun an individual was trapped inside a hollow tree about 8 feet from the ground."—G. C. S.

Vernacular names—TAW-CHWET (Popa), MYE-CHWET (Pagan).

MILLARDIA KATHLEENÆ, Thos.

The Burmese soft furred Field Rat.

1914. *Millardia kathleenæ*, Thomas, Journ., B.N.H.S. XXIII, p. 29.

♂ 8, ♀ 6. Mt. Popa.

♂ 21, ♀ 16. Pagan.

"Plentiful at Pagan, especially in hedges around cultivation, also occurring around Popamyo Village where it was much less numerous—nocturnal."—G. C. S.

Vernacular name—LE-CHWET (Popa).

RHIZOMYS CASTANEUS, Blyth.

The bay Bamboo Rat.

(Synonymy in No. 14.)

♀ 1. Mingun.

♂ 15, ♀ 14. Mt. Popa.

1 (flat skin) Ngazun, Sagaing. (Collected by Maj. F. C. Owens).

(See also Report No. 14.)

"Occurring round every camp visited, both in dry and damp, open and forest localities. Particularly numerous on Mt. Popa, where its mounds were observed almost at the top of the mountain. *Rhizomys* evidently breeds before coming to its full size. The very large specimens were not at all plentiful, yet the more plentiful medium sized ones were evidently breeding and to all appearances adult. I doubt if these rats often come above ground except for mating or migrating purposes. The mounds on Mt. Popa were much larger than those made by the small species on the Shan Plateau."

Vernacular name—PWE (Burmese).

ACANTHION BRACHYURUM, L.

The Malay Porcupine.

1758. *Hystrix brachyura*, Linnæus. Syst: Nat: 10th Ed. p. 57.

♂ 2, ♀ 1. Mt. Popa; 2. Allappa, Sagaing (collected by Maj. F. C. Owens.)

I had identified these as *H. bengalensis*, Blyth. They were neither *leucura* nor *hodgsoni*, it seemed to me therefore that they must be *bengalensis*, which I had never seen but with the description of which they agree

quite fairly. On going more fully into the matter (on receipt of specimens from Tenasserim) it became evident that the proper name for them was undoubtedly as above. It seems to me probable that when a specimen of true *bengalensis* becomes available it will prove to be an *Acanthion*.

"Plentiful on Mt. Popa. Porcupines are frequently gregarious as shown by collections of earths with many entrances at Popa and Ngapyinium. Weight of a large female 30 lbs."—G. C. S.

Vernacular name—PHYU (Burmese).

LEPUS PEGUENSIS, Blyth.

The Pegu Hare.

1855. *Lepus peguensis*. Blyth, J. A. S. B. XXIV, p. 471.

1891. *Lepus peguensis*. Blanford, Mammalia, No. 322.

♂ 1. Mingun.

♂ 4, ♀ 15. Mt. Popa.

1. Ngazun, Sagaing. (Collected by Maj. F. C. Owens).

2. Lower Chindwin. (Collected by G. W. Dawson, I. C. S.).

This is a very regular series and agrees closely with Blyth's description. From the Bengal Hare (*ruficaudatus*) it is at once distinguishable by its black tail and white feet. Its near neighbour to the East is *siamensis* in which the feet are not white. There is in the National Collection a small series of a Hare, taken by Major Harington beyond Bhamo, which is certainly not this species. It is to be regretted that the Survey failed to obtain the Hare of the Shan Plateau.

"Very plentiful in cultivated ground on the slopes of Mount Popa and apparently widely distributed throughout the dry zone, but not always in large numbers. Occurring to at least as far North as Mandalay and Shwebo. A hare occurs on the Shan Plateau, fairly plentiful between Maymyo and Lashio and probably extends to the Salween."—G. C. S.

Vernacular name—YON (Burmese).

MUNTIACUS VAGINALIS, Bodd.

The Barking Deer.

(Synonymy in No. 2).

♂ 1, ♀ 1. Mingun.

♀ 2. Ngapyinin.

♂ 1, ♀ 2. Mt. Popa.

(See also Reports Nos. 2, 5, 7, 11, 14 and 15).

"Plentiful everywhere where there is sufficient cover. Barking Deer go about singly or in pairs and appear never to be gregarious, though there is no doubt that females are more numerous than males. In contrast with their habits in S. India, where in scrub jungle they are replaced by the Four horned Antelope, in Burma the Barking Deer is abundant everywhere, both on the hills and in the plains, in tree Forest and among low open scrub."—G. C. S.

Vernacular name—GYI (Burmese).

(?) *SUS CRISTATUS*, Wagn.

The Indian Wild Boar.

1 juv. (Skull only) Sagaing. (Collected by Maj. F. C. Owens).

Vernacular name—TAW-WET (Burmese) MU, (Shan).

MANIS AURITA, Hodgs.

*The Eastern Pangolin.*1836. *Manis aurita*, Hodgson, J. A. S. B., V., p. 234.1891. *Manis aurita*, Blanford, Mammalia, No. 400 (*partim*).

♂ 2. Mt. Popa.

In dealing with *Manis crassicaudata* in Report No. 3, I pointed out that the names *pentadactyla* and *brachyura* belonged to the Formosan Pangolin. It is possible that that form is identical with the Nepal-Sikkhim one *aurita*, which apparently extends unchanged into, at any rate Upper Burma. These specimens are certainly *aurita* and I adopt that name for them leaving the question as to their identity with the Chinese Pangolin to be settled later.

"Said to be uncommon on Popa, but probably occurring in suitable localities throughout the dry belt. They are nocturnal, but, when migrating from one district to another, it is not uncommon for Pangolins to travel by day. Skins are occasionally brought into Mandalay Bazaar for sale as medicine to the Burmans and Chinese."—G. C. S.

Vernacular names—THIN-GWE-GYAT or THENG-U-JAH (Burmese), LIN (Shan).

APPENDIX.

1. *Hipposideros armiger*, Hodgs. The great Himalayan Leaf-nosed Bat.
♂ 2. Gokteik, N. Shan States. Collected by J. P. Cook.
2. *Pipistrellus minus*, Wrought.—The Southern Dwarf Pipistrelle.
1.—Maymyo. Collected by J. P. Cook.
3. *Scotophilus kuhli*, Leach.—The Common Yellow Bat.
♂ 1, ♀ 1. Hsipaw, N. Shan States. Collected by J. P. Cook.
4. *Pachyura hodgsoni*, Blyth.—The Himalayan Pigmy Shrew.
1. Hsipaw, N. Shan States. Collected by J. P. Cook.
5. *Petaurista lylei venningi*, Thos.—Venning's Flying Squirrel.
1891. *Pteromys gunmanensis*, Blanford. Mammalia, No. 230 (*partim*).
1914. *Petaurista lylei venningi*, Thomas., Journ. B.N.H.S. Vol. XXIII, p. 26.
♂ 1. Kalaw, S. Shan States. Collected by Capt. F. E. W. Venning.
6. *Sciuropterus spadiceus*, Blyth.—The Pigmy Flying Squirrel.
1847. *Sciuropterus spadiceus*, Blyth, J. A. S. B. XVI, p. 867.
1891. *Sciuropterus spadiceus*, Blanford. Mammalia, No. 236.
♂ 1. Maymyo. Collected by G. B. H. Fell, C.I.E., I.C.S.
7. *Sciurus ferrugineus*, F. Cuv.—The Burmese Bay Squirrel.
♂ 1. Lawksawk, S. Shan States.
♀ 1. Gokteik, N. Shan States. Collected by J. P. Cook.
8. *Sciurus atrodorsalis shani*, Ryley.—The Shan Squirrel.
♂ 1. Maymyo.
1. Hsipaw, N. Shan States. Collected by J. P. Cook.
♂ 2, ♀ 1. Kalaw, S. Shan States. Collected by Capt. Venning.
9. *Sciurus phayrei blanfordi*, Blyth.—Blanford's Squirrel.
♂ 1, ♀ 1. Hsipaw, N. Shan States. Collected by J. P. Cook.

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10. *Dremomys rufigenis adamsoni*, Thos.—Adamson's Squirrel.
 1891. *Sciurus rufigenis*, Blanford. Mammalia, No. 244 (*partim*).
 1914. *Dremomys rufigenis adamsoni*, Thomas., Journ. B. N. H. S.,
 Vol. XXIII, p. 25.

♀ 1. Kalaw, S. Shan States. Collected by Capt. Venning.

♀ 1, 1. Maymyo. Collected by J. P. Cook.

A small squirrel, about 7 inches long, with a tail a couple of inches less. Grizzled black and yellow, with markedly red cheeks, the under parts white, except the midrib of the tail, which is red, like the cheeks. The chin is much whiter than in true *rufigenis* and the hairs of the inner sides of the thighs are white to their bases instead of being partially slatey as in the Southern form. The specimens ranked as *rufigenis* by Miss Ryley, in the Shan States Report (No. 14) belong also to this subspecies.

11. *Epinomys rufescens* var.—The Common Indian Rat.

♀ 1. Gokteik, N. Shan States. Collected by J. P. Cook.

12. *Bandicota* sp.

♂ 1. Thaton, Tenasserim. Collected by R. Y. Littledale.

13. *Muntiacus vaginalis*, Bodd.—The Barking Deer.

1 juv. Hsipaw, N. Shan States. Collected by J. P. Cook.

The above specimens, though included in this collection, belong to the Fauna of the Shan States, dealt with by Miss Ryley in Report No. 14. Out of these 13 names no less than 7 do not appear in that Report. Of these latter there are two (Nos. 9 and 10 above) which are names modified as the result of further examination and they apply equally to the specimens mentioned in Report No. 14. The remaining 5 are additions to our list of the Shan Plateau Fauna—I believe it has always been the hope of the organisers of the Indian Mammal Survey (it certainly has been mine) that, besides its direct results, it would stimulate the interest of Members in the Mammal Fauna of their Districts, and thus result in its being supplemented by their exertions. The above List, I venture to think, illustrates how much remains to be done, and how much can be effected by local private effort, after the Survey has passed on from any given District.

The following specimens, also included in the present Collection, belong to areas, whose Fauna has not yet been collected by the Survey.

1. *Felis tigris*, L. The Tiger.

1. Mogoung, Myitkyina Dist. Collected by Capt. F. E. Venning.

2. *Felis pardus*, L. The Panther.

1. Kamaing, Myitkyina Dist. Collected by Capt. F. E. Venning.

3. *Felis affinis*, Gray. The Jungle Cat.

1 (no skull). Thayetmyo. Collected by F. B. Leach, I.C.S.

4. *Felis bengalensis*. Kerr. The Leopard Cat.

2. (no skulls) Thayetmyo. Collected by F. B. Leach, I.C.S.

Mr. Leach's two skins represent two types of colouring, one is normal *bengalensis* (?) the other, with confluent spots and streaks is Hodgson's *pardoehrous*. Can Mr. Leach or any other Member throw any light on the question whether these are mere individual variations, or represent distinct species (?) the above two specimens were taken at the same place on the same day.

5. *Aonyx cinerea*, Illig. The Clawless Otter.
♂ 1. Upper Chindwin. Collected by S. F. Hopwood, I.F.S.
6. *Sciurus ferrugineus*, F. Cuv.—The Burmese Bay Squirrel.
 1. Pegu Yomas. Collected by J. P. Cook.
7. *Epimys bowersi*, And.—Anderson's Rat.
 1878. *Epimys bowersi*, And. An. Zool. Res., p. 304.
 1891. *Epimys bowersi*, Blanford, Mammalia, No. 276.
 2. Kindat, Chin Hills. Collected by S. F. Hopwood, I.F.S.

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

(INCLUDING THOSE MET WITH IN THE HILL STATIONS OF THE BOMBAY PRESIDENCY).

BY

T. R. BELL, I.F.S.

(Continued from page 103 of Volume XXIII.)

PART XVII.

(With Plate G.)

NOTE ON THE PIERIDÆ.

In regard to the coloured pictures of the butterflies belonging to the family Pieridæ in plates I, J, K, and L, there is little to be said. They are, generally, very good indeed. The following might be noted :—

Leptosia xyphia.—Pl. I, figure 58. Is very good, except that the white is not pure enough on the upperside, the brown has too much of red in it.

Delias eucharis.—Pl. I, figures 59, male; 59a, female. It is the same with this again: the brown has too much red everywhere and the yellow of the underside is not clear enough.

Anaphæis mesentina.—Pl. I, figures 60, male; 60a, female. The male is very good except that the brown is not black enough; the yellow of the underside of the hind wing in the female is too red-soiled.

Huphina phryne.—Pl. I, figures 61, male; 61a, female. The male is too yellow on the upperside; it should be pure white. The female is better but the anal margin of the upperside of the hind wing is too yellow; the underside of hind wing is too soiled, the yellow is not clear enough.

Irias pyrene.—Pl. J, figures 65, male; 65a, female. In the female figure the underside is too red in tone, the markings are browner; the upperside is, perhaps, also, not clear enough, the base of the costa of fore wing is too red.

Irias marianne.—Pl. I, figure 62, male; Pl. J, figure 65b, female. The male is very good. In the female the broad border of the hind wing on the upperside is not black enough; the base of fore wing on the upperside is not clear enough grey. There has been a mistake made here evidently, for the artist mistook figure 65b for a form of the female of *I. pyrene*.

Catopsilia.—Pl. L. Here the yellows and whites of the uppersides are good, being pure and clear; however the yellows of the undersides of figures 72a, b and 73a are again too red.

Terias.—Pl. K, figure 69, *Terias læta*, is too red altogether both above and below; the same might be said about 70a, but it is the usual fault of the process.

Pareronia hippia.—Pl. I, figures 63, male; 63a, female. Here the male upperside is not clear enough blue, the veins are not black enough; the female underside is too red.

The figures of *Colotis*, Pl. J, figures 6u, 67a and 68, as well as those of *Hebomoia glaucippe*, figures 66, male, 66a, female on the same plate are very perfect.

In the description of *Colotis eucharis* should be added that the male upperside fore wing has the veins in the immediate vicinity of the orange apical patch sometimes touched with black so as to form a more or less continuous inner black edging; that the orange patch at apex of fore wing in the female is sometimes wanting, its place being taken by the white ground-colour. In the female the inner black bordering to this patch is always

curved which distinguishes it at once from the female of *C. etrida*, with which it might easily be confounded, this border being always straight in this latter species; also the preapical black spot (often a short bar) on upperside of hind wing is much more oblique than in *etrida* female, pointing towards the end of cell instead of straight downwards towards the outer disc of wing as in that species.

It has been said, under *Pieris brassicae*, that no records of the earlier stages are known and that it is somewhat doubtful whether it is a Plains insect or not. This has elicited, from Mr. T. Bainbrigge Fletcher, Government Entomologist of the Agricultural Department at Pusa, the information that the butterfly has been reared in the Plains at Pusa and that "it occurs within about 100 miles of the Himalayas in Eastern and North Bengal, Bihar, the United Provinces and the Punjab."

Family—LYCENIDÆ.

This family of butterflies is composed of small to medium sized insects of which many are some shade of blue on the upperside, the males being generally brighter coloured than the females; some species are brown, others copper coloured, black, green (none in these papers however) or white and are often banded, striped, mottled or suffused. They all have the great advantage to classification or recognition of invariably being marked alike on the underside in both sexes whatever the difference in colour of the upperside so that there is little difficulty in connecting the males and females of any particular species. The shade of the underside ground-colour may differ somewhat but the markings never.

A.—Hind wing without tail or lobe of any sort, (see Pl. H, fig. 56).

a. Underside white, silvery white or light grey.

a¹. Size 1.5" to 2": male upperside with the ground-colour orange-red, the female with the ground-colour white .. *Curetis* (Pl. H, fig. 56 ♂, 56a ♀.) (17).

b¹. Size smaller: at most 1.36".

a². Upperside blue, at least towards bases of wings, underside white spotted with black (in *akasa*, Horsf. there is very little blue sometimes: it is more greyish) *Lycanopsis*. (4)

b². Upperside dark brown or black without any blue; underside white or greyish-white, spotted with brown or black.

a³. Underside, fore wing: pure white with the cell unmarked.. *Neopitheops*. (1)

b³. Underside, fore wing: greyish-white with a single, dark dot in the cell *Megisba*. (3)

This represents the untailed form of *Megisba*; for the tailed form see under C. The amount of blue on the uppersides of *Lycanopsis* varies with the species: in the females it is always confined to the bases of the wings and there is always a large, white, discal area.

b. Underside some shade of brown as ground-colour, often very light.

a¹. Underside, both wings: brownish-white crossed by numerous, transverse, darker brown strigæ *Spalgis*. (2)

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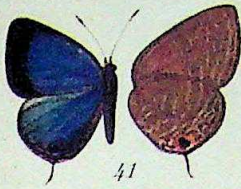
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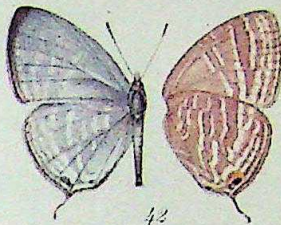
THE COMMON BUTTERFLIES OF THE PLAINS
OF INDIA.

EXPLANATION OF PLATE G.

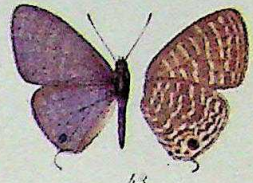
- Figs. 41, 41 a, *Jamides bochus* ♂ ♀.
,, 42, 42 a, ,, *celeno* ♂ ♀.
,, 43, 43 a, *Nacaduba atrata* ♂ ♀.
,, 44, 44 a, *Catachrysops strabo* ♂ ♀.
,, 45, 45 a, *Tarucus plinus* ♂ ♀.
,, 46, 46 a, *Castalius rosimon* ♂ ♀.
,, 47, 47 a, ,, *decidia* ♂ ♀
,, 48, 48 a, *Talicauda nyseus* ♂ ♀
,, 49, *Catachrysops cnejus* ♂.
,, 50, 50 a, *Tarucus theophrastes* ♂ ♀.
,, 51, 51 a, *Aphnaeus vulcanus* ♂ ♀.



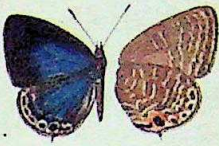
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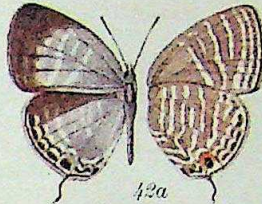
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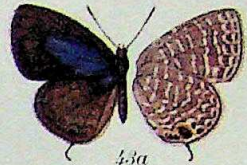
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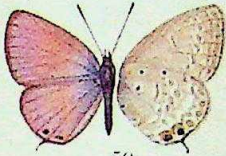
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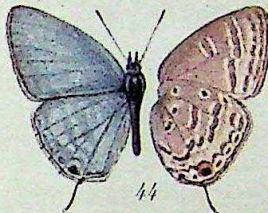
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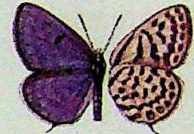
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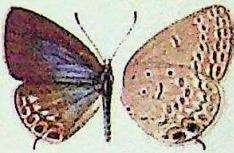
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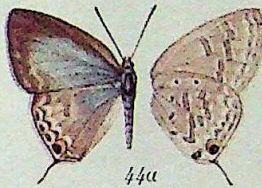
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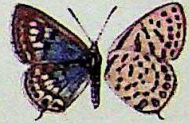
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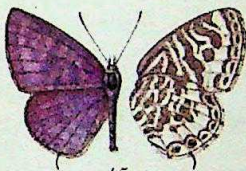
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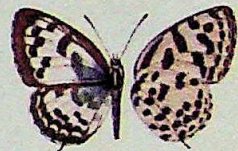
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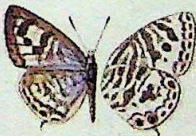
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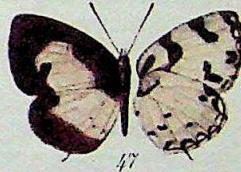
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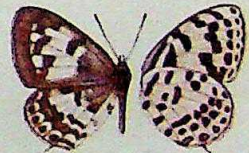
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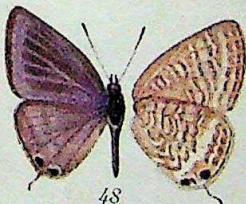
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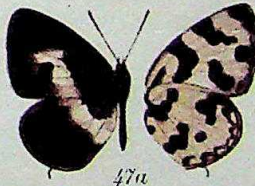
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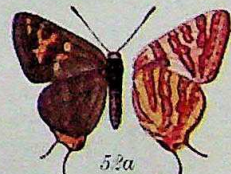
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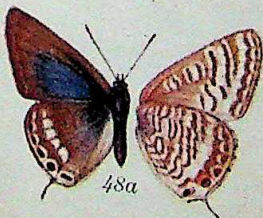
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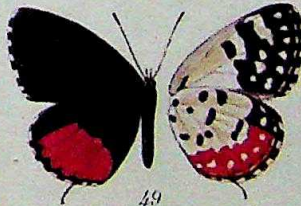
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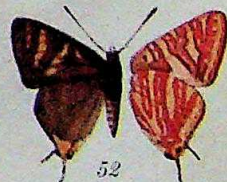
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52

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δ^1 . Underside, both wings: with no such strigæ: with spots, bands, &c.

α^2 . Underside, hind wing: with three subbasal dots, often black: one subcostal, one in base of cell, one towards inner margin: all in a row.

α^3 . Underside, fore wing: with a postdiscal band formed by two parallel, white lines enclosing a strip of ground-colour .. *Azanus*. (6)

δ^3 . Underside, fore wing: with a series of postdiscal, generally dark-brown or black spots between veins (in *Chilades trochilus*, Frey. this series is more or less band-like, light, but each spot is dislocated from the other to form a band-like series with step-like margin).

α^4 . Underside, hind wing: with a postdiscal series of well separated spots; underside, fore wing: with a white-circled dot just below costa between the mark on discocellular veinlets and the postdiscal series of spots (this costal dot is wanting in *Zizera otis* however) .. *Zizera*. (5)

δ^4 . Underside, fore wing: with no such dot, hind wing: the postdiscal series of spots band-like, irregular .. *Chilades*. (7)

δ^2 . Underside, hind wing: with no such dots; only whitish lines forming transverse bands .. *Nacaduba*. (11)

This *Nacaduba* includes only the one species *N. noreia*, Feld, which has no tail to the hindwing. For the tailed species, see C of this key.

B.—Hind wing with a short tooth or projection at ends of veins 1, 2, 3 showing merely as a projection in the fringe round the margin in *L. emolus*, Godart .. *Lycænesthes*. (9)

C.—Hind wing with a little thread-like tail at end of vein 2 on margin (see Pl. G, fig. 49).

a. Upperside: ground-colour uniform black with hinder half of wing orange .. *Talicada*. (Pl. G, fig. 49). (8)

b. Upperside: ground-colour white, brown or some shade of blue, generally with black or brown border of varying width and, in certain species, black spots.

α^1 . Fore wing underside: cell unmarked inside the discocellular borders.

a^2 . Underside, hind wing: 3 subbasal spots: one subcostal, one near inner margin and one between these and generally, a fourth below centre of costa, one or more of which may be black. In *Everes* the spot near inner margin may be very indistinct.

a^3 . Underside, hind wing: with a postdiscal series of spots, always darker than the light-grey ground-colour, distinct and more or less separated, rarely in a shape of a band, the end one on inner margin always punctiform . . . *Everes*. (10)

b^3 . Underside, hind wing: with a postdiscal band, more or less broken with the end of it on inner margin elongate, not punctiform; the band darker than the light brown ground colour . . . *Catochrysops*. (13)

b^2 . Underside, hind wing: with no such spots . . . *Jamides*. (12).

b^1 . Underside, fore wing: with the cell marked inside the discocellular streaks.

a^2 . Underside, fore wing: with a single dot only in cell . . . *Megisba*. (3).

This is the tailed form of *Megisba malaya*, Hors.; the tailless form of the same species will be found under A of this key.

b^2 . Underside, fore wing: with a band across cell formed by a strip of ground-colour included between white lines.

a^3 . Underside, fore wing: the band across cell not continued below bottom margin of cell . . . *Lampides*. (16).

The band across cell is really formed by two parallel 'brown' ground-colour lines on a patch of whitish suffusion in this case.

b^3 Underside, fore wing: with the band across cell continued across the whole wing, formed by parallel, white lines on the brownish ground-colour . . . *Nacaduba*. (11).

The tailed form of *Nacaduba* come here; i.e., all except *N. noreia*, Feld. which is under A.

c^2 . Underside, fore wing: with a short or long streak in cell from base along its top edge.

a^3 . Underside, hind wing: the whole surface more or less uniformly covered with dark dots, lines and bands on the white or yellowish ground-colour . . . *Tarnicus*. (14.)

- b*³. Underside, hind wing : with a complete discal band of unsullied white ground-colour from inner margin to, at least, just before apex *Castalius*. (15).

The ground-colour of the upperside in males of *Tarucus* is concolorous, slatey-blue in *theophrastus*, F., and *plinius*, F.; dark-brown or blackish in *ananda*, de N. In *Castalius* the ground-colour is white with broad black borders and, in *rosimon*, F., a blue border to the black. The females in both genera have the ground-colour white like the males in *Castalius*, in *Tarucus* unlike.

D.—Hind wing : lobed, or nearly so at anal angle and with only one tail (see Pl. H, figs. 54, 54a, 55, 57, 57a.).

- a*. Hind wing : the tail feathery, long as hind wing; colour deep velvety black on upperside in male with the tail cream-coloured brown in female, the tail white *Bindahara*. (38).

- b*. Hind wing with the tail broad and nearly half as long as wing; colour of both sexes alike, golden-yellow or orange-yellow with broad black border *Loxura* (Pl. H, fig. 55) (34).

- c*. Hind wing : tail broad and much shorter (see Pl. H, figs. 57, 57a). Colour on the upperside brilliant blue, with or without black border: blue, purple or brown in the female, with black border.

In *Surendra*, *Iraota*, *Mahathala* there are little points at the ends of the veins above the tail but these cannot be called tails.

- a*¹. Hind wing : costal margin (look at the underside of wing) before apex produced upwards to form a triangular tooth *Mahathala*. (20).

- b*¹. Hind wing : costal margin even.

- a*². Hind wing : the tail at end of vein 1 broader than a thread, the point at end of vein 2 in *Iraota* sometimes quite long.

- a*³. Underside : variegated with grey and white on a rich chocolate ground which may shade into brownish towards outer margin *Iraota*. (18).

- b*³. Underside : plain brown, rufous, &c., at most dark or blackish suffusion in places, the only distinct marking being a narrow, straight, line-like fascia from apex of fore wing curving to inner margin of hind wing; this fascia may be obsolescent sometimes *Amblypodia*. (21).

- b*². Hind wing with the tail at end of vein 2.
- a*³. Both wings, underside: marked with distinct bands .. *Arhopala*. (22).
- b*³. Both wings, underside: marked with lines, not bands.. *Surendra* male. (19).
- d*. Hind wing: the tail thread-like, at end of vein 2.
- a*¹. Fore wing, underside: with a narrow, discal band with straight margins from before middle of costa to, or near to inner margin before tornal angle, of even width throughout: less than 2mm. in width at costa *Rapata*. (36)
- b*¹. Fore wing, underside: the band over 2mm. at costa, the margins more or less dislocated sometimes.
- a*². Upperside: rich red (male) or fine earth-brown (female), with broad, black border, always without sign of discal white or orange patch .. *Deudorix*. (35)
- b*². Upperside: colour dark slate-blue bright metallic blue (males) or brown suffused towards base of wings with slate-blue or bright blue (females); with orange or white, discal patch on fore wing sometimes. *Virachola*. (Pl. H, figs. 54, 54a.) (39).
- E*.—Hind wing with anal lobe and two tails. (see Pl. G., figs. 52, 52a; Pl. H, figs. 53, 53a)
- a*. Hind wing: the tails feathery, long and ribbon-like and white.
- a*¹. Hind wing: the outer tail three times as long as the inner (the outer as long or longer than the hindwing) expanse of insect over 1.5" *Cheritra* (37).
- b*¹. Hind wing: the outer tail only half as long as inner tail (the longer hardly as long as the wing); expanse of insect 1.2" *Zeltus*. (30)
- b*. Hind wing: the tails ordinary, broadened, not long nor white *Surendra* female. (19)
- This is the female of *Surendra* male under D; the female is brown on the upperside.
- c*. Hind wing: with outer tail at least thread-like, of ordinary length, the other never very long.
- a*¹. Underside, fore wing: the cell quite immaculate.
- a*². Underside, both wings: white with brown markings; a subbasal dot below costa of hindwing *Chliaria* (28)
- b*². Underside, both wings: silver, white, clear grey or rather light creamy brown, quite immaculate up to a thin, postmedial, dark line. (Pl. H, figs. 53, 53a).

α^3 . Underside: creamy-brown with an indian-red, thin line to both wings postmedially; the males have a lobe on the inner margin of fore wing upon which, underneath are two tufts or pencils of hair, one above black and directed outwardly, the lower one attached to the edge of lobe being light ochreous; the male upperside is bright metallic blue, the female light sky-blue, both with a wide black apex to forewings *Creon*. (24).

δ^3 . Underside: silver or clear, pearly-grey with a dark, post-medial line at least to hind wing; the males with the inner (hinder) margin of fore wing convex at middle and, underneath, bearing a tuft of black hairs; the upper margin of hind wing bears also a large, glandular patch of scales at base of subcostal nervure. The males and females are similar to *Creon* as regards colouration of uppersides .. *Pratapa*. (25).

c^3 . Underside: pure chalk-white as far as a postmedial line on both wings (*indra*, Moore), or a clear light grey with a thin, dark, postmedial line at least to the hind wing; males bright, brilliant, metallic-blue on the upperside or sky-blue (like female: *jehana*, Moore); females are brown (*indra*, Moore) or light-blue *Tajuria* (*Pl. H.*, figs 53, 53a.) (26).

δ^1 . Underside, fore wing: the cell marked with transverse bands or spots which are continued across wings.

a . Underside: the transverse bands centred with silvery scales *Aphnaeus* (*Pl. G.*, figs. 52, 52a.) (27).

b . Underside: the transverse bands or spots thinly edged with white *Zezius* male. (28).

The female of *Zezius* will be found under G ; she is light blue on the upperside, the male being dull copper red.

F . Hind wing with lobe and three tails which are not very long and rather broad *Thaduka*. (29).

G . Hind wing with no lobe, or lobe very small and three thread-like tails.

a. Upperside: ground-colour dark brown; the underside: variegated inside a postmedial, white band profusely with white and black lines on an orange ground *Rathinda*. (31).

b. Upperside: ground-colour blue or brown (brown only in one species: *Horaga viola*, Moore).

a¹. Underside, fore wing: brownish-yellow with a broad, white, transverse, discal fascia to both wings *Horaga*. (33)

b¹. Underside, fore wing: with no fascia; wings traversed by bands, complete or broken.

a. Underside: the bands edged with silver.. *Catapacilma*. (32)

b. Underside: the bands edge with white.... *Zezius* female. (23)

This section G contains butterflies with the lobe to the hind wing very small or entirely wanting; it is easily distinguishable in *Zezius*, is very small in *Horaga* and is quite negligible in *Rathinda* and *Catapacilma*. The male of *Zezius* with only two tails is in E of this key.

1. Genus—NEOPITHECOPS.

Only one species, dark purplish-brown; paler on the disc; sometimes, in the dry season, with white, discal patch; underside white, with black markings. Size: 0.6" to 1.1" *zalmora*.

The larva is normal, green in colour; the pupa normal, green or pinkish-brown blotched darker. Food-plant: *Murraya pentaphylla* of the *Rutaceae*; feeding upon the flowers generally; larva attended by ants.

2. Genus—SPALGIS.

One species only. Colour dull brown, darker towards apex, generally with a white patch on disc of fore wing; underside grey-brown with many darker strigæ. Size: 0.8" to 1.3" *epius*.

The larva and pupa are normal in shape but the larva covers itself over with the dry skins and cottony fluff of the *Coccidae* or scale insects among which it lives and upon which it feeds; it is one of the very few insectivorous larvae known amongst the butterflies in India; it is certainly the only one known that will under no circumstances eat vegetable food.

3. Genus—MEGISEA.

Contains only one species, in appearance very like *Neopitheops zalmora*. Size: 0.9" to 1.3" *malaya*.
The larva and pupa are unknown as is also the foodplant.

4. Genus—LYCÆNOPSIS.

There are five species occurring which may be met with in the Plains or hill stations of the Bombay Presidency. The commonest by far, however, is *puspa*.
A. Undersides in both sexes with the markings thin or small.

- a. Male and female similar: the upperside fore wing white with broad, black border both with blue only at base. Size: 1.1" to 1.14" *akasa*.
- b. Male and female: upperside dissimilar; blue in the male; the females distinguished as under:—
- a¹. Upperside of male dull indigo-blue; the female with white discal patch to fore wing. Size: 1.34" to 1.52" *albidisca*.
- b¹. Upperside of male uniform dark purplish-blue; that of female bluish-purple, paler outwards. Size: 1.25" to 1.40" .. *limbata*.
- B. Undersides in both sexes with the markings prominent and coarse.
- a. Underside slightly bluish-white, the veins very slenderly black. Size: 1.28" to 1.36" .. *puspa*.
- b. Underside opaque chalk-white, the veins concolorous. Size: 1.42" to 1.45" *lilacea*.

The shape of the larva and pupa of *puspa* is normal, but the former is covered with minute, white, star-topped hairs; the colour is generally green; the pupa is pinkish with darker blotching. The food-plant is always leguminous: *Cylista* and others.

5. Genus—ZIZERA.

- A. Fore wing, underside: a dot in the middle of cell.
- a. Expanse: over 1.25" mm. Upperside, male: light-blue, silvery in certain lights; female, brownish black, sometimes purplish at base of wings. Size: 1.10" to 1.23" *maha*.
- b. Expanse: under 0.75". Upperside, male, violaceous blue; female, pale satiny-brown. Size: 0.7" to 0.96" *lysimon*.
- B. Fore wing, underside: cell immaculate.
- a. Fore wing, underside: a spot on costa just before the discocellular veins. Size: 0.8" to 0.95" *gaika*.
- b. Fore wing, underside: no such spot. Size: 0.8" to 1.1" *otis*.

These are all Plains species and somewhat weak fliers. They are generally found flying near the ground, amongst grass, &c. The larva and pupa are normal, though both are rather thin, the former being flower-feeders and vary, therefore, in colour. *Lysimon* feeds on *Acanthaceæ*; *gaika* and *otis* upon *Leguminosæ*, mostly Vetches. The larvæ are attended by ants at times.

6. Genus—AZANUS.

- A. Fore wing, underside: a black dot in the middle of the cell. Size: 1" *jesous*.
- B. Fore wing, underside: no dot in cell.
- a. Underside: greyish-brown with, on the hind wing, a conspicuous, transverse, sub-basal series of four black spots. Size: 0.8" to 0.95" *ubaldus*.

- b. Underside: greyish-white with, on the hind wing, these spots only slightly traceable.
Size: 1" to 1.1" *uranus*.

These are true butterflies of the Plains, never, seemingly, being found anywhere in jungles. They are all blue on the uppersides in the males and brown in the females. *Ubaldis* has, in the male, a patch of specialized scales on the disc of the forewing; *uranus* is probably only a seasonal form of it.

Larvæ and pupæ normal. The foodplant is *Acacia indica*, a species of the Plains. The larvæ are attended by ants.

7. Genus—CHILADES.

- A.—Hind wing, underside: with a row of, at least three, nearly marginal, perfectly round, black ocelli sprinkled with metallic scales, often an ochreous patch near tornus. Size: .07" to 1" .. *trochilus*.

- B.—Hind wing, underside: with no such ocelli.
Size: 1.10" to 1.26" *lains*.

Lains is blue on the upperside in the male, in the female only at the base of the wings generally; *trochilus* always dark silvery brown.

Larvæ of both species normal as well as the pupæ. The larvæ of *lains* feeds on limes, of the other on *Heliotropum* (*Scrophulariaceæ*) and *Leguminosæ*: vetches, and are attended by ants as a general rule.

8. Genus—TALICADA.

- Only one species. Size: 1.30" to 1.60" *nyseus* (Pl. G, fig. 49).
A not uncommon insect though somewhat local.

Larva and pupa normal; foodplant: *Bryophyllum calycinum* of the *Crassulaceæ*; the larva feeds inside the fleshy leaves and is sometimes attended by ants.

9. Genus—LYCÆNESTHES.

- A.—Hind wing, underside: with a white-ringed well defined dark spot near base below the costa.
Size: 1.1" to 1.25" *lycenina*.

- B.—Hind wing, underside: no such spot. Size: 1.1" to 1.3" *emolus*.

Both these butterflies are hill species and may possibly be met with at the Hill stations on the Western Ghats.

Larvæ and pupæ normal. Larvæ attended by the common Red Ant (*Ecophylla smaragdina*, F.). Foodplants: *Wagatea spicata* and *Acacia pennata* for the former; *Cassia*, *Saraca*, *Heynea trijuga* and *Nephelium Litchi* for the latter.

10. Genus—EVERES.

- Only one species, found everywhere, most commonly away from jungles. Colour blue of some shade, occasionally nearly completely brown in the female on upperside. Size: 0.9" to 1.2" *argiades*.

Larva and pupa normal. Foodplant: *Laguminosæ*.

11. Genus—NACADUBA.

- A.—Expanse under 1" *ardates*.
B.—Expanse over 1" *atrata*. (Pl. G, figs.
43 ♂, 43a ♀.)

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The colour of the males upperside is dark slaty-purple, the female dark brown with the disc whitish, suffused with blue in both species; the undersides are light brownish with darker bands defined by whitish lines, of *ardates* the ground-colour is sometimes fawn.

Larvæ and pupæ normal, the former attended by ants. Foodplants: *Acacia* in the case of *ardates*, mainly the flowers being eaten; *Embelia robusta* for the other.

12. Genus—JAMIDES.

A.—Upperside: brilliant blue in the male, paler and not brilliant in the female; both wings with a brown border. Size: 1.25" to 1.5" *bochus*. (Pl. G, figs. 41 ♂, 41a ♀.)

B.—Upperside: pale bluish-white in both sexes, with dark-brown borders. Size: 1" to 1.6" *celeno*. (Pl. G, figs. 42 ♂, 42a ♀.)

There is another species, like *celeno* but with a wash of brilliant blue over the white, called *elpis*, found in the hills of Western India: the larva feeds upon cardamoms. Both *bochus* and *celeno* are Plain species.

Larvæ and pupæ normal; attended by ants occasionally. Foodplants: *Leguminosæ*, generally the flowers.

13. Genus—CATACHRYSOR.

A.—Fore wing, underside: a dot on costa between discocellulars and postdiscal band of spots. Size: 1" to 1.5" *strabo*. (Pl. G, figs. 44 ♂, 44a ♀.)

B.—Fore wing, underside: no such dot on costa.
a. Hind wing upperside: two distinct black ocelli just inside margin near tornus. Size: 1" to 1.3" *cnejus*. (Pl. G, figs. 50 ♂, 50a ♀.)

b. Hind wing, upperside: only one of these ocelli distinct, rarely both. Size: 0.9" to 1.25" *pandava*.

Are all three common Plain insects, but are found also in the jungles and hills. The first two are light-greyish on the underside, *pandava* rather dark brownish; upperside in the males of the first two is pale violet or pale purplish, of the females brown, the disc in *strabo* female being whitish, the base shot with blue in the females of both species; upperside of male *pandava* lavender-blue, female like that of *cnejus*.

Larvæ and pupæ normal, attended by ants generally; foodplant: *Leguminosæ*, such plants as *Butea frondosa*, *Acacia*, &c., generally, the flowers being eaten; but the larvæ of *strabo* are found on other things also. Figured on Pl. II, figs. 21, larva 21a, pupa of *cnejus*.

14. Genus—TARUCUS.

A.—Underside of hind wing: a continuous line bordering the terminal row of spots on the inside.

a. Underside, hind wing: the terminal row of spots all metallic blue. Size: 0.8" to 1.20" *theophrastus*. (Pl. G, figs. 51 ♂, 51a ♀.)

b. Underside, hind wing: the terminal row of spots dark brown. Size: 0.8" to 1.2" *plinius*. (Pl. G, figs. 45 ♂, 45a ♀.)

B.—Underside of hind wing: no continuous line bordering the terminal row of spots. Size: 0·8" to 1·2" *ananda*.

The two first species are found everywhere, in the Plains and in the hills, in the jungles and in the dry, waste places of India, being rarer, however, in the jungle tracts. *Ananda* is a hill species, plentiful in Kanara. The males of the first species are pale purple to violet-blue on the upperside; of the second dark violet; *ananda* is deep-purple with the spots showing through from the underside; the females of the first two are blackish-brown with white discal markings, both wings shot with blue towards the base, to a greater extent in *theophrastus* than in the other; female *ananda* is suffused over the whitish disc with brown and is also shot with blue towards base.

The larvæ and pupæ are quite normal and are greedily attended by ants, generally of the genus *Cremastogaster*; so much are these insects necessary to the comfort of *theophrastus* and *ananda*, indeed, that the genus of the foodplant seems to be of little importance as long as the ants are there. *Plinius* has been bred on flowers of *Albizzia* and *Sesbania*; the other two on *Rhamnaceæ* (*Zizyphus*) and other plants, such as Mistletoe, Jasmine, &c.

15. Genus—CASTALIUS.

A.—Hind wing, underside: outer margin with a lunulate black line and no regular row of black spots inside it. Size: 1·1" to 1·35" .. *decidia*. (*Pl. G, figs.* 47 ♂, 47a ♀.)

B.—Hind wing, underside: outer margin with no lunulate black line but a regular row of black spots instead of it.

a. Hind wing, underside: with a single row of black spots inside the marginal one. Size: 1·1" to 1·25" *ethion*.

b. Hind wing, underside: with three rows of black spots inside marginal row. Size: 1·1" to 1·35" *rosimon*. (*Pl. G, figs.* 46 ♂, 46a ♀.)

These butterflies are really not separable from *Tarucus*. All but *rosimon* are hill insects, *decidia* being, however, found sparingly in the Plains. The males are like the females in colouration as a rule; *ethion* male differing from its female by having a blue edging to the broad black border, differing also from both sexes of *decidia* in this. Both species differ from *rosimon* by the broader, more even-edged black border to wings and by not being shot with blue at the base.

The larvæ of all are normal; so are the pupæ; they are all attended by ants. The foodplants of the species is generally some species of *Zizyphus* of the family *Rhamnaceæ*.

16. Genus—LAMPIDES.

Only one species, Size: 1·25" to 1·40" *bæticus*. (*Pl. G, figs.* 48 ♂, 48a ♀.)

A widely distributed insect, found throughout the Old World. Male: violet-blue above with a minutely frosted appearance; female upperside brown with, sometimes, bluish sprinkling towards bases of wings. Underside pale greyish or brownish ochreous with bands.

Larva and pupa normal. Foodplant: *Leguminosæ* of many kinds; the flowers being eaten. Larva is attended by ants.

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17. Genus—CURETIS.

A. Underside: white, not silvery. Size: 1·25" to 1·4" *thetis*. (Pl. H, Figs. 56 ♂, 56a ♀.)

B. Underside: silvery-white, powdered sparsely with black dust. Size: 1·8" to 2" *bulis*.

Thetis may be found anywhere; *bulis* is more or less confined to the hill tracts and jungles. The males of both are dark glossy cupreous-red, females white, both with black borders.

The larvæ and pupæ are abnormal, never attended by ants; see Introductory part of these Papers, paragraph 2 on page 29 (14) of Vol. XIX, Part I of the 15th April 1909 of this Journal. The foodplants are all *Leguminosæ*. See Pl. II, figs. 28, larva; 28a, pupa.

18. Genus—IRAOTA.

Only one species. Size: 1·5" to 2" *timoleon*.

Male upperside deep metallic-blue with broad black border, female same blue but not metallic, also with border.

Larva and pupa normal, attended by ants sometimes. Foodplant *Ficus indica*, the common Banyan: the young shoots and tender leaves.

19. Genus—SURENDRA.

Only one species. Size: 1·55" to 1·62" *quercetorum*.

Male purplish-blue, broad black border; female brown. This is a hill insect, never, as far as information goes, found in the plain country.

Larva flattened with segments 3 and 4 somewhat prominent; pupa normal; attended by ants. Foodplant: *Acacia cæsia* and *pennata*.

20. Genus—MAHATPALA.

There is only one species. Size: 1·6" to 1·9" *ameria*.

The insect is said to have been captured in Calcutta and, for that reason, it is mentioned here. Nothing is known about its transformations.

21. Genus—AMBLYPODIA.

Only one species. Size: 1·6" to 2" *anita*.

Males, upperside deep purple with narrow black border to wing. Females have the disc brighter blue from base, outer area dark-brown, or the whole wings dark-brown. Underside of various shades of brown, red-brown or ochreous.

Larva of the type of *Surendra* rather, but deeper, narrowed in after-part so as to resemble a shoe in outline, oily yellow-green with electric-blue longitudinal bands; pupa normal, stout; never attended by ants. Foodplant: *Ola scandens*. See Pl. II, figs. 22, larva; 22a, pupa.

This is not a Plains butterfly but may possibly be met with in the hill stations of the Western Ghats.

22. Genus—ARHOPALA.

A. Size large: 2" to 2·5".

a. Fore wing, underside: markings blurred and indistinct to a large degree, the spots in the cell only recognisable as such by their borders of white *centaurus*. (Pl. H, figs. 57 ♂, 57a ♀.)

b. Fore wing, underside: the markings clear and well defined, the spots in the cell darker than the ground-colour *amantes*.

B. Size smaller: 1·4" to 1·7" *hewitsoni*.

These are our brightest "Blues", and the largest; the males are very brilliant, with narrow black borders to wings, the females less so with broad black borders. They are very powerful fliers and difficult to catch. *Hewitsoni* is not found in South India, the other two are, though *amantes* is apparently confined to the hills.

The larvæ are much flattened, the pupæ are normal; the two first species are much attended by Red Ants: *Ecophylla smaragdina* in the nests of which the pupation often takes place. The foodplants are, generally, *Terminalia tomentosa* and *paniculata* of the Family *Combretaceæ*; but, the ants seemingly being necessary to the health of the larvæ, these latter have been found also on *Xylia dolabriformis* and other *Leguminosæ* as also on *Lagerstræmia* of the *Lythraceæ*. See Pl. II, figs. 23, larva; 23a, pupa.

23. Genus—ZESIUS.

Only one species. Size: 1.3" to 1.9" *chrysomallus*.

The male is pale cupreous-red with outer margins brownish, the female, larger, is brown shot with blue at base of wings.

The larva is abnormal, of the shape of *Arhopala* but with the front and hinder segments dilated into teeth; pupa normal; attended constantly by Red Ants, without which the larva will not live in health; pupation nearly always in the ants' nest. Foodplant: generally *Combretaceæ*. The larvæ are regular cannibals, eating each other and the pupæ whenever they get a chance.

24. Genus—CREON.

One species. Size: 1.2" to 1.5" *cleobis*.

A hill species. The larva is somewhat abnormal, being in shape like that of *Amblypodia*; the pupa is attached by the tail, the anal segments being lengthened and broadened out at the extremity like a horse-shoe for the purpose, and stands out free from the support. Foodplant; *Loranthus* generally *L. scurrula*.

25. Genus—PRATAPA.

One species. Size: 1.2" to 1.5" *deva*.

Also a hill species. The larva is like that of *Creon* above and so is the pupa. There is another butterfly which occurs in Kanara but is very rare even there, which has a larva and pupa very like this species, namely, *Ops melastigma*. It is larger than *P. deva* and has a large black stigma on the disc of the forewing on the upperside; it is brown-creamy in colour on the underside.

Another species, known as *Tajuria argentea*, Aur., is also found in Kanara but it is a *Pratapa*, not a *Tajuria*, having the same velvety larva, not a naked one as in the latter genus. The larvæ of *Creon* and *Pratapa* are pink-brown, as is also that of *Ops*, while that of *argentea* is green.

26. Genus—TAJURIA.

A. Underside: the outer half of both wings brown, separated sharply from the pure-white basal half. Size: 1.4" to 1.8" *indra*.

B. Underside: whole surface uniform.

a. Hind wing, underside: with metallic greeny-blue scales on black tornal spots and between them. Size: 1.2"-1.8"

.. *cippus*. (Pl. H, figs. 53♂, 53a♀.)

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- b. Hind wing, underside: with some light blue scales between the spots, never metallic.

Size: 1.2" 1.5" *jehana*.

The males of *indra* and *cippus* are deep metallic-blue on the upperside, the female of the former is dark-brown, of the latter light-blue with broad black border; both sexes of *jehana* are rather like the female of *cippus*: light-blue.

The larvæ are of the same type as those of *Camena*, so are the pupæ; and, like those, are hardly ever attended by ants; the foodplant is also *Mistletoe*. See Pl. II., figs. 23, larva; 23a, pupa.

27. Genus—*APHNÆUS*.

- A. Hind wing, underside: with the subbasal band quite regular and entire, never broken; colour upperside: brown with orange markings.
Size: 0.8" to 1.5" *vulcanus*. (Pl. G, figs. 52 ♂, 52a ♀.)

- B. Hind wing, underside: with the subbasal band broken, generally into three spots, never regular or entire.

- a. Fore wing, upperside: very dark slaty-blue in male, or dark-brown in female, bordered broadly with black, the markings of underside showing dimly through, though never yellow. Size: 1.2" to 1.8" *lohita*.

The dry-season form of this has been designated ordinarily as a different species: *A. concanus*.

- b. Fore wing, upperside: pale lilacine-blue in male, pale-brown in female, with broad darker border; markings of underside showing through much paler. Size: 1.1" to 1.5" *lilacinus*.

- c. Fore wing, upperside: brown with large triangular orange patch before apex, reaching the costa, markings of underside showing through on it as black spots and bands. Size: 1.35" *ictis*.

- A. *elima* is probably the dry-season form of this, being much paler underneath both as to ground-colour and markings.

- d. Fore wing upperside and hind wing: chiefly orange, markings of underside showing through as black spots and bands throughout. Size: 1"-1.6" *hypargyrus*.

All but *lohita* and typical *ictis* are Plains butterflies, these two being chiefly confined to the hills. They are all very fast fliers and cannot be mistaken for any other *Lycanid* owing to the generally bright undersides, always with metallic scales bordering the bands.

The larvæ are abnormal, with tubercles; pupæ normal; much attended by ants; the foodplant is chosen, indeed, on account of the ants.

28. Genus—*CHLIARIA*.

- A.—Fore wing, underside: a dot inside the costa above middle of cell. Size: 0.9" to 1.2" *othona*.

- B.—Fore wing, underside: no such dot. Size: 1.1" to 1.3" *nilgirica*.

These are both hill species. *Othona* male is sky-blue on the upperside; the female is dusky brown with the hinder third of the hindwing suffused

with grey. *Nilgirica* male is reddish-brown, glossed with purple in some lights; the female is dull smoky blackish.

The larva of *othona* which is the only species bred, is of normal shape except that it has a pair of well-separated, short tail-points; it is generally red in colour. The pupa is normal. The foodplant is Orchids, the most common being *Cottonia*, *Arides crispum* and *Rhynchostylis*, the flowers generally being eaten. Ants sometimes attend the larvæ.

29. Genus—THADUKA.

One species. Size: 1.6" to 1.9" *multicaudata*.

Male and female alike on the upperside: brilliant azure-blue, bordered broadly black.

Larva arrhopaline; pupa normal. Foodplant: *Trewia nudiflora* of the *Euphorbiaceæ*. The caterpillars are gregarious.

30. Genus—ZELTUS.

One species. Size: 1.2" to 1.5" *etolus*.

This is not a butterfly of the Plains. The male is black with long feathery white tails; the female is brown with similar tails. Transformations unknown.

31. Genus—RATHINDA.

One species. Size: 0.95" to 1.3" *amor*.

Not a Plains species either; though it may be found on the borders. It is sure to be found in all hill stations.

Larva abnormal with long, dorsal and lateral, fleshy processes; pupa like that of *Tajuria*, *Creon*, &c. Foodplant: *Ixora*, *Croton*, *Blachia*, *Loranthus*, &c., &c. See Pl. II., figs. 27, larva; 27a, pupa.

32. Genus—CATAPECILMA.

One species only. Size: 1.1" to 1.4" *elegans*.

Male, upperside: dark violet-blue; female, pale violet-blue, the first bordered narrowly black, the second broadly.

Larva and pupa normal; very much frequented by ants. Foodplant: *Terminalia paniculata* of the *Combretaceæ*.

33. Genus—HORAGA.

A.—Underside, both wings: with a broad white, oval fascia crossing them. Size: 1.15" to 1.35" . . . *onyx*.

B.—Underside: a white spot only on the fore-wing. Size: 0.9" to 1" *viola*.

Both hill species, found in Kanara. Transformations unknown, at least for the Bombay species.

34. Genus—LOXURA.

Only a single species. Size: 1.25" to 1.8" . . . *atymmus*. (Pl. H, fig. 55.)

Upperside florid orange to saffron-yellow with fuscous margins to wings.

Larva and pupa of the type of *Pratapa*; attended by ants. Foodplant: *Dioscorea pentaphylla*, one of the Yams.

35. Genus—DEUDORIX.

One species. Size: 1.4" to 2" *epijarbas*.

Male dark orange-scarlet on upperside; female fuscous-brown; both with a broad, dark brown border to wings. A fast flier.

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The larva is somewhat of the type of *Pratapa* but has the anal segment flattened slantingly; pupa normal. Foodplants: *Pomegranate*, *Connarus*; the larva living inside the fruits and feeding there; occasionally visited by ants.

36. Genus—RAPALA.

A.—Upperside, both wings: scarlet; female brick-red, with black borders. Size: 1.3" to 1.6" .. *melampus*.

B.—Upperside, both wings: blue in both sexes.

a. Underside, both wings: with postmedial band narrow: under mm. Size: 1.1" to 1.5" .. *schistacea*.

b. Underside, both wings: with the post-medial band broader: over mm. Size: 1.1" to 1.5" .. *oriseis*.

These last two are very like each other, the male of the first is dark slatey-blue on the upperside, the disc of hindwing shot with brilliant blue in some lights; the female is purple-blue. *Oriseis* male has the upperside dark brown, glossed with dull indigo-blue; hindwing not shot; female lighter blue. They are all fast fliers, fond of flowers.

Larva abnormal, being tuberculate-toothed; the pupæ are normal. Foodplants: *Leguminosæ*, *Rhamnaceæ*, *Combretaceæ*, the flowers being eaten. The larvæ are sometimes attended by ants. See Pl. II, figs. 24, larva; 24a, pupa.

37. Genus—CHERITRA.

One species. Size: 1.6" to 1.8" .. *jaffra*.

A hill species, very common, however, where it occurs. It is very fond of the flowers of species of *Lea* of the *Vitaceæ*.

Larva abnormal, shape of *Pratapa* but with teeth along dorsal line; the pupa is also like that of *Pratapa*, freely suspended or fixed by tail only. The foodplants are Cinnamon, *Xylia*, *Ivora*, many trees, the young leaves being eaten. See Pl. II, figs. 25, larva; 25a, pupa.

38. Genus—BINDAHARA.

One species. Size: 1.2" to 1.6" .. *sugriva*.

Male dark velvet-black on the upperside with the latter half of the hindwing margined somewhat broadly brilliant dark-blue; the tails cream-coloured. The female is brown, the margin of hindwing white where the male is blue; the tails pure white. The males are fond of *Lea* flowers also like *Cheritra*.

Larva like that of *Deudorix* exactly, feeding inside fruits of *Salacia* pupa normal; both occasionally visited by ants.

39. Genus—VIRACHOLA.

A.—Upperside; brilliant light-blue with broad, black border; often a discal, orange spot on fore wing in the male, white spot always present in the female in the same place. Size: 1.4" to 1.9" for male, 1.8" to 2.8" for female .. *perse*.

B.—Upperside: dark violet-blue or violet-brown, the female with an orange discal spot on fore-wing. Size: 1.5" to 2" .. *isocrates*.

Large rapidly flying butterflies, fairly common everywhere.

Larva like those of *Deudorix*, feeding in fruits of the same kind; *R. dumetorum*, Tamarind, even *Nurromica*.

(To be continued.)

NOTE ON FERNS COLLECTED AT PACHMARHI, C.P.

BY

R. J. D. GRAHAM, ECONOMIC BOTANIST, C.P.

General.—The following note is the result of collecting tours made in October 1911, May 1912 and June 1914. The object of the tours was to collect ferns for the Public Gardens, Pachmarhi. So successful were the collections yielding from a comparatively small area the large number of 41 species that it has seemed worth while placing the results on record. The absence of any records of the Cryptogamic Flora in the Central Provinces furnishes an additional excuse for publishing the note. At the same time the hope is expressed that the present list may form the starting point of a detailed survey within the limits of these Provinces of this most interesting and graceful group of plants.

Situation.—Pachmarhi, the summer residence of the Local Administration, is situated in $22^{\circ} 28' N.$ and $78^{\circ} 26' E.$ on a plateau in the Mahadeo Hills of Satpura Range. The town gives the name to the plateau and surrounding country, the area extending to 23 square miles of which 12 square miles are occupied by the plateau. The elevation of the plateau is roughly 3,500 ft.; the encircling hills rise in places to 4,500 feet while the ravines descend at least 1,000 feet. Pachmarhi is reached by a road 32 miles long running to the south from Piparia station on the main line between Itarsi and Jabulpore.

Topography.—The plateau surrounded by its higher hills from which, however, it is separated by deep ravines, is somewhat cup-shaped. The deep and wild ravines which radiate from all sides contrast sharply with the parklike plateau where grassy vistas among trees of *Shorea robusta*, Gaertn., *Terminalia tomentosa*, Bedd., and *Eugenia jambolana*, Lamk., present a very homelike aspect. It is to the ravines or khuds that one must turn in the search for ferns though very xerophyllous forms occur on the plateau itself. So narrow are the khuds in places with their wall-like sides towering to a height of over 1,000 feet that the sun reaches the depths for but a few hours, minutes in some places, daily. Running at the foot of the khuds are perennial crystal streams which with the half shade furnish the moisture necessary for a natural conservatory. No adequate description of the grandeur of the scenery can be conveyed in a few lines. Those who have not been privileged to see the glories of Pachmarhi may glean a faint idea of the reality from the first chapters of "The Highlands of Central India."

Geology.—The rock is a sandstone of enormous thickness known as the Pachmarhi sandstone belonging to the Mahadeva group of the upper Gondwana series. The thickness has been estimated at

8,000 feet. The strata have a dip of 100° to the North. The sandstone is readily denuded hence the formation of the characteristic ravines which start abruptly from the edge of the plateau with a sheer drop of anything up to 1,000 or 1,500 feet.

Climate.—The highest temperature recorded is 104° F. in June, the lowest 30° F. in December. The average day temperature in the cold weather is 71.3° F., dropping at night to 47.5° F. In the hot weather the average maximum is 93.1° F. and the minimum 75.1° F. In the ravines the temperature is more uniform. The rainfall is heavy averaging 77 inches annually. The rains commence early in June and continue into October.

Notes of the Fern Flora.—As mentioned above, the full glory of the ferns is to be seen in the shady moist-ravines. There the beautiful tree ferns *Cyathea spinulosa*, Wall., *Alsophila glabra*, Hook., and *Angiopteris evecta*, Hoffm., flourish, the first raising its feathery crowns to a height of 15-20 feet. On the banks where the soil has collected are the humbler but not less graceful herbaceous species. Growing on the gravelly margins of the streams are clumps of the Royal Fern (*Osmunda regalis*, Linn.) while on the half submerged rocks *Acrostichum lanceolatum*, Hook., finds a home. In the spray of the water falls Maiden Hair (*Adiantum capillus-veneris*, Linn.) flourishes, while on the higher levels occur *Nephrolepis cordifolia*, Bak., and *Nephrolepis exaltata*, Schott., protected in the less humid conditions by their cuticularised fronds. On the more open stretches where gravel and sand have been deposited *Equisetum debile*, Roxb., a horse tail pushes its rhizomes, contrasting strangely in its rigid xerophyllous stems, with its hygrophyllous relations. *Psilotum triquetrum*, Sw., flourishes in places in the cracks in sheer walls, justifying its xerophyllous structure by the places where it finds a home.

Amongst the rocks on the plateau the commonest ferns, the Silver fern, (*Cheilanthes farinosa*, Kauff.) and *Adiantum caudatum*, Linn., the Strawberry maiden hair, so called from its runner-like fronds. The hypogaeal parts of both are annual, the former is further protected in the dry positions in which it grows by the silvery coating of hairs on the under surface of the leaves and the habit of rolling its leaves in the dry season with the dorsal surface uppermost, the latter by a covering of hairs and its prostrate habit. *Adiantum lunulatum*, Burm., being without these protections exists only in the wet season. *Nephrodium odoratum*, Bank., is a graceful fern with annual fronds, the half-exposed rhizome being protected by a thick covering of chaffy scales. *Lygodium pinnatifidum*, Sw., is an interesting climbing fern, the annual leaves being heavily cuticularised. The hardest fern of all is *Polypodium lineare*, Thumb. var. *simplex*, Sw., whose simple, almost leathery, leaves rolled from the margin with the cuticularised ventral surface outwards

persist even in the hot weather. *Selaginella pruriiflora*, Bak., is a delicate plant in shady places while *S. rupestris*, Spring., found not very far from Pachmarhi is interesting because of its habit of rolling up into a ball in the dry weather. Placed in water the balls unfold into green rosettes. *Lycopodium cernuum*, Linn., is a graceful little marsh plant resembling a miniature fir tree found at Pagara a few miles from Pachmarhi.

In conclusion I have to express my thanks to Mr. M. S. Ramaswamy, Officiating Curator of the Herbarium, Royal Botanic Gardens, Sibpur, Calcutta, for comparing and verifying the names of the ferns included in the list.

LIST OF VASCULAR CRYPTOGRAMS.

Order Filices.

- Sub order ... Gleicheniaceæ.
 Gleichenia linearis, Linn.
- Sub order ... Polypodiaceæ.
 Tribe ... Cyatheaæ.
 Cyathea spinulosa, Wall.
 Alsophila glabra, Hook.
- Tribe ... Davalliææ.
 Davallia tenuifolia, Sw.
 Davallia strigosa, Sw.
- Tribe ... Lindsayææ.
 Lindsaya ensifolia, Sw.
- Tribe ... Pterideææ.
 Adiantum lunulatum, Burm.
 Adiantum caudatum, Linn.
 Adiantum capillus-veneris, Linn.
 Cheilanthes farinosa, Kauff.
 Pteris quadriaurita, Retz.
- Tribe ... Blechnææ.
 Blechnum orientale, Linn.
- Tribe ... Asplenieææ.
 Asplenium esculentum, Presl.
 Asplenium latifolium, Don.
 Asplenium heterocarpum, Wall.
 Actinopteris dichotoma, Bedd.
- Tribe ... Aspidæææ.
 Aspidium amabile, Bl.
 Nephrodium calcaratum, Hook.
 Nephrodium calcaratum, var. *sericea*, Bedd.
 Nephrodium calcaratum, var. *falciloba*, Bedd.
 Nephrodium cochleatum, Don.
 Nephrodium sparsum, Don.
 Nephrodium odoratum, Bak.

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- Nephrodium cicutarium, Bak.
 Nephrodium extensum, Hook.
 Nephrodium molle, Desv.
 Nephrolepis cordifolia, Bak.
 Nephrolepis exaltata, Schott.
- Tribe ... Polypodieæ.
 Polypodium multileneatum, Wall.
 Polypodium obliquatum, Bl.
 Polypodium lineare, Thumb. var. simplex, Sw.
- Tribe ... Acrosticheæ.
 Polybotrya appendiculatum, Sw.
 Acrostichum lanceolatum, Hook.
- Sub order ... Osmundææ.
 Osmunda regalis, Linn.
- Sub order ... Schizeaceæ.
 Lygodium pinnatifidum, Sw.
- Sub order ... Marattiaceæ.
 Angiopteris evecta, Haffm.
 Order Equisetineæ.
- Sub order ... Equisetaceæ.
 Equisetum debile, Roxb.
 Order Lycopodineæ.
- Sub order ... Lycopodiaceæ.
 Lycopodium cernuum, Linn.
 Psilotum triquetrum, Sw.
- Sub order ... Selaginellaceæ.
 Selaginella ruprestris, Spring.
 Selaginella proniflora, Bak.

NOTES ON SOME NEW AND INTERESTING BUTTERFLIES FROM MANIPUR AND THE NAGA HILLS.

BY

LIEUT.-COL. H. C. TYTLER, 17TH INFANTRY.

PART II.

Subfamily—*Nymphalinae*.

EULEPIS LISSAINEI, n. sp. (Pl. I, Fig. 4 ♂).

This belongs to the *Marceæ-Meghaduta* group and may possibly be the dry-season form of the latter, but as I failed to take it in the wet-season it is better to keep it distinct for the present. From *marceæ*, which I only know from Seitz's figure, it differs on upper forewing in having the spot beyond the cell much larger and the spots on the black terminal border quite separate with their *inner* edges even and *outer* edges conical. In *marceæ* it is not so, the spots are continuous forming a greenish band, the *outer* edge being straight and the *inner* edge forming a row of rounded or conical projections. On the hindwing the subterminal black band is much narrower and there is a terminal row of black spots somewhat as in *meghaduta*, but which is quite wanting in the figure of *marceæ*. The anal angle has two black spots placed on the green colour, whereas in *marceæ* only one spot is shown placed on a pinkish ground. In size it differs greatly being very much smaller.

From *meghaduta*, which I also only know from Seitz's figure, vol. ix, pl. 135a, it differs in being much smaller and less heavily marked. The dusky area on *upperside* near base of forewing and along vein 1 of hindwing is entirely wanting. On *upper* hindwing the terminal black line, broad and distinct in *meghaduta*, is much reduced and entirely wanting at the apex. The subterminal spots so well marked in *meghaduta* are also much reduced near tornal angle and obsolescent or entirely wanting near the apex.

Underside: ground colour pale yellowish green. Forewing costa, except near apex and termen, broadly chocolate; a similar subterminal chocolate band outwardly margined with blackish; a subcostal band as on *upperside* commencing at the subterminal band and continued along vein 4 and lower edge of cell to just below base of vein 2, and joined to the costal chocolate band by a similar band along the discocellulars, both margined with black. Hindwing: a submarginal band edged with blackish from costa to tornus; a subbasal similar band continued along vein, and joining the submarginal band a terminal narrow chocolate band, rather paler towards the apex, inwardly margined with small rather obsolescent black spots; and finally a small black spot on dorsum on the inner edged of the submarginal band.

Expanse: ♂♂ 2.52—2.73".

Sixteen males taken near Phesima, Naga Hills, at about 6,000' at the end of April, May and the beginning of June.

APATURA SORDIDA, Moore.

Rather common in the Manipur valley where numerous specimens of both sexes were taken more or less throughout the summer and autumn. A single specimen was also obtained on the Silchar Road in October. It is extremely local.

APATURA SORDIDA NAGA, sub-sp. nov. (Pl. I, Fig. 3 ♂).

Male. *Upperside*: very similar to the typical form but the wings are of somewhat different shape. Forewing: termen not so emarginate; Macular

band pale yellow and not pure white as in typical form. Hindwing: termen round and not emarginate near tornus; tornal ocellus not ringed and very indistinct. *Underside*: rather greyer than typical form with a distinct golden sheen along terminal area. Forewing: a blue centre to the ocellus and cell closed by a brown bar. Hindwing: the discal brown band very concave near the costa and the white spots outwardly further placed from the discal band than in typical *sordida*.

Expanse: ♂ 2.45—2.9".

A single ♂ was taken at Yakama, Naga Hills, at about 6,000' in June; three ♂♂ at the same place in September and seven more in October.

A very distinct and well marked race which apparently flies at a much higher elevation than the typical form which in Manipur flies at about 2,600'.

The specimen of *A. sordida* recorded by me from the Naga Hills, J. B. N. H. Soc., vol. xxi, p. 56, is probably referable to this race. I am unable to compare it as I left it behind in England.

APATURA ULUPI, Doherty.

NOTICE.

Owing to the War the four coloured plates to accompany Lt.-Col. Tytler's paper have not yet arrived. We hope to publish them with the remaining part of his paper in the next issue.

EDITORS.

and September at about 6,000'.

The males are not so rare as I thought, though very local, and many specimens were taken near Jakama in the Naga Hills during July, August and September and a few at Kirban and Takabama where I had not previously met with it.

This species will, I think, prove to be a race of *A. ulupi*, Doherty.

APATURA MANIPURIENSIS, n. sp. (Pl. II, Figs. 11, 12; ♂ ♀.)

Male. *Upperside*: both wings smoky brown with hyaline very pale markings, slightly tinted with mauve reflections, and almost devoid of scales in places. Forewing: termen deeply excavated at its middle; cell and base of interspaces 2 and 3 hyaline dusted with pale brown scales; a brown streak, sometimes divided in two, in the middle of the cell and another similar streak closing it; a broad hyaline post median area, almost reaching the termen, inwardly sharply defined and outwardly diffuse bearing a large black spot in interspace 2, a very small and indistinct spot sometimes in interspace 3 and a large brown diffuse patch in interspace 1; a preapical pale spot in interspace 6; and finally a brown terminal band, broadest in interspaces 2 and 3. Hindwing: basal half hyaline tinted with very pale mauve and slightly dusted with brown scales near costa.

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BY

LIEUT.-COL. H. C. TYTLER, 17TH INFANTRY.

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This belongs to the *Marcæa-Meghaduta* group and may possibly be the dry-season form of the latter, but as I failed to take it in the wet-season it is better to keep it distinct for the present. From *marcæa*, which I only know from Seitz's figure, it differs on upper forewing in having the spot beyond the cell much larger and the spots on the black terminal border

commencing at the base of vein 2, and joined to the costal chocolate band by a similar band along the discocellulars, both margined with black. Hindwing: a submarginal band edged with blackish from costa to tornus; a subbasal similar band continued along vein, and joining the submarginal band a terminal narrow chocolate band, rather paler towards the apex, inwardly; margined with small rather obsolescent black spots; and finally a small black spot on dorsum on the inner edged of the submarginal band.

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Male. *Upperside*: very similar to the typical form but the wings are of somewhat different shape. Forewing: termen not so emarginate; Macular

NOTES ON BUTTERFLIES FROM THE NAGA HILLS. 503

band pale yellow and not pure white as in typical form. Hindwing: termen round and not emarginate near tornus; tornal ocellus not ringed and very indistinct. *Underside*: rather greyer than typical form with a distinct golden sheen along terminal area. Forewing: a blue centre to the ocellus and cell closed by a brown bar. Hindwing: the discal brown band very concave near the costa and the white spots outwardly further placed from the discal band than in typical *sordida*.

Expanse: ♂ 2.45—2.9".

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A very distinct and well marked race which apparently flies at a much higher elevation than the typical form which in Manipur flies at about 2,600'.

The specimen of *A. sordida* recorded by me from the Naga Hills, J. B. N. H. Soc., vol. xxi, p. 56, is probably referable to this race. I am unable to compare it as I left it behind in England.

APATURA ULUPI, Doherty.

A single male of this rare butterfly was taken by Captain Porter on the Dihang River, Abu Hills, in June, and is now in my collection.

APATURA FLORENCIÆ, n. sp. (Pl. II, Fig. 10 ♀).

Female. *Upperside*: both wings termen rounder than in the male; ground colour dusky green. Forewing: outer half dark brown; no spot in cell, markings otherwise placed as in male but pale creamy yellow in colour with the exception of the submarginal spot in inter space 2 and the marginal line near the tornus which are tinged with darker yellow. Hindwing: markings as in male but bases of interspaces 5 and 6 not paler than rest of the wing. *Underside*: both wings pale silvery bluish green. Forewing: no pale diffuse spot in cell; markings otherwise as in male but almost pure white in colour; the discal spots and those placed beyond the cell inwardly margined with dark purplish black. Hindwing: markings as in male but discal band straighter.

Expanse: ♀ ♀ 2.85—3.05".

♀ Variety *albopunctata*, n. v. *Upperside*: the spots are all white with no tinge of cream colour.

The female is very rare and only six specimens were obtained in August and September at about 6,500'.

The males are not so rare as I thought, though very local, and many specimens were taken near Jakama in the Naga Hills during July, August and September and a few at Kirban and Takabama where I had not previously met with it.

This species will, I think, prove to be a race of *A. ulupi*, Doherty.

APATURA MANIPURIENSIS, n. sp. (Pl. II, Figs. 11, 12; ♂ ♀.)

Male. *Upperside*: both wings smoky brown with hyaline very pale markings, slightly tinted with mauve reflections, and almost devoid of scales in places. Forewing: termen deeply excavated at its middle; cell and base of interspaces 2 and 3 hyaline dusted with pale brown scales; a brown streak, sometimes divided in two, in the middle of the cell and another similar streak closing it; a broad hyaline post median area, almost reaching the termen, inwardly sharply defined and outwardly diffuse bearing a large black spot in interspace 2, a very small and indistinct spot sometimes in interspace 3 and a large brown diffuse patch in interspace 1; a preapical pale spot in interspace 6; and finally a brown terminal band, broadest in interspaces 2 and 3. Hindwing: basal half hyaline tinted with very pale mauve and slightly dusted with brown scales near costa.

forming an indistinct band as far as lower edge of cell; outer half brown, traversed by a pale pellucid violet tinted band composed of lunules, rather pointed outwardly near costal end; an indistinct dark spot in interspace 2; and lastly a dark terminal waved line. *Underside*: pale silvery mauve; hyaline markings as on upperside; brown markings much paler and greatly reduced becoming obsolescent in the subterminal area: a black spot in interspace 2 of forewing and a similar spot in interspace 2 of hindwing centred with bluish white and encircled by a yellow and a pale brown ring; inner half of both wings defined by a narrow pale brown line commencing in interspace 6 of forewing and continued to dorsum of hindwing; a post discal; broad pale brown band, commencing in interspace 1 of forewing and continued to near tornus of hindwing; a subterminal area of the ground colour, broad on the hindwing, narrower on the forewing, where it merges into the postdiscal hyaline area; and finally a pale brown terminal line.

Female. *Upperside*: somewhat similar to the male but nearly entirely brown. Forewing: termen not so deeply excavated; a pale whitish narrow discal band composed of contiguous spots which are pellucid in interspaces 4-6; apical area of cell and interspaces 2 and 3, as far as the discal white band, darker brown; a pale subapical hyaline spot; an indistinct black spot in interspace 2; and a subterminal rather indistinct pale lunular band outwardly bordered with dark brown. Hindwing: a discal whitish band, dusted with brown and rather indistinct near dorsum, and pellucid in interspaces 6 and 7; a dark spot in interspace 2; a subterminal pale lunular band and a terminal dark band as in male. *Underside*: ground colour pale buff brown. Forewing: a white discal band as on upperside inwardly sharply defined and bordered by dark brown, outwardly somewhat diffuse; a preapical pale pellucid spot in interspace 6; ocellus in interspace 2 as in male; a diffuse pale brown patch in interspace 1 outwardly bordered with lilac; and lastly a terminal pale brown line. Hindwing: a white band as on upperside inwardly sharply defined and bordered with dark brown, outwardly diffuse and bordered by a rather broad pale brown band bearing an ocellus similar to the male in interspace 2 and some pale marks in interspaces 3-6; a broad subterminal area of the ground colour suffused with mauve near the tornus and apex; and lastly a terminal waved pale brown line. Eyes hairy.

Expanse: ♂♂ 2.78-3.2"; ♀ 3.1".

Described from 15 ♂♂ and 1 ♀ taken at the foot of the hills near Seborg Manipur, on the Burma Road, in April. They were found by my Native collectors flying in a deep shady nullah. I sent the collectors back to the same place in May, but they did not see one again. The insect appears to be single brooded and is either very rare or extremely local.

It belongs to the subgenus *Eulaceura*, Moore, hitherto represented within Indian limits by a single species, *osteria*, Westwood.

EURIPUS FUNEBRIS, Leech.

A single male was taken by my Native collector at Yakama, Naga Hills, at 5,000 ft. in July 1911, and three more at the same place, during the same month, in 1912.

Capt. Evans to whom I sent a figure for identification writes: "The *Memnon* like Nymphalid is *Euripus funebris*, Leech, described from Omeishan, very rare. Your figure and description agree exactly with Leech's figure, etc., in "Butterflies of China." A form of it has recently been described from Formosa in the *Entomologist*."

The butterfly is certainly very rare in the Naga Hills. I had collectors at Yakama all through July this year, especially to look for this insect but they failed to come across it.

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ABROTA GANGA, Moore.

A single female was taken by Capt. Porter on the Dihang River, Abor Hills, in July, which differs from Bingham's description and figure and from Seitz's figure in having all the pale markings more suffused with dusky green, with the exception of the discal band on the hindwing which is almost white and very narrow.

SYMPHÆDRA DIRTEA, Fabr.

Three forms of *dirtea* occur in Manipur and one in the Naga Hills, viz. typical *dirtea*, Fabr. Occurs at Sebong, Eastern Manipur Hills, where several specimens were taken from March to July.

Var. *intermedia*, n. v. is an intermediate form connecting *dirtea* and *khasiana*. Many specimens were taken at Sebong, Eastern Manipur Hills, on the Irang River, Western Manipur Hills, and at Nichuguard, Naga Hills, from March to October.

Var. *khasiana*, Swinhoe: typical specimens were taken on the Irang River, Western Manipur Hills and near Sebong, Eastern Manipur Hills, in March and April, and again in October.

I do not think the difference in facies is due to seasonal causes as all three forms fly together on the Eastern Manipur Hills and varieties *intermedia* and *khasiana* fly together on the Cachar Road, Western Manipur Hills. In the Naga Hills var. *intermedia* only was met with.

DOPHLA DURGA SPLENDENS, sub-sp. nov.

A single male taken near the foot of the Hills on the Ukral Road, about 23 miles east of Imphal, in July at about 3,000' differs considerably from typical forms I have in my collection from Sikkim and the Abor Hills.

Upperside: white discal band on both wings broader; forewing otherwise similar.

Hindwing: the black margin to both edges of the white discal band broader and more distinct: the blue border beyond outer edge of discal band composed of a complete series of well marked lunules with the outer edge well defined; in typical *durga* from Sikkim and Assam this blue band is only formed into distinct lunules near the costal end; the tornal half always having the outer edge even and rather diffuse; terminal detached blue lunular streaks very distinct. *Underside*: basal ground colour purer blue and not so tinged with green; all the markings broader and more distinct; the subterminal area marked with large black lunules which are towards the apex of both wings very markedly outwardly pointed; terminal bluish white patches more prominent. Somewhat larger than typical forms before me.

Expanse: ♂ 4.52'.

This appears to be a very distinct race of *D. durga*.

DOPHLA CURVIFASCIA, n. sp. (Pl. II, Fig. 13).

Male and female. *Upperside*: bronzy olive green somewhat similar to that of *D. nava*, but of a much more bronzy tint. Forewing: apex acute; termen nearly straight; cell with a medial and apical pair of short transverse black sinuous lines, the former extending into interspace 1 forming a circle and a black dot below; the space between the two pairs of dark lines paler than the ground colour; a postdiscal transverse band of spots as in *D. sahadeva* but much smaller; the spots in interspaces 2 and 3 sullied with the ground colour; a preapical pair of pale almost white spots in interspaces 6 and 8 below which is a pale yellowish green area, commencing in a point in interspace 5 and ending on the dorsum filling the outer half of interspace 1 and inwardly broadly bordered with dark blackish green; a

subterminal narrow dark band from costa to middle of interspace 2 and a similar terminal band broad at the apex and ending in a point at the tornus. Hindwing: a conspicuous curved pale yellow band commencing in interspace 7, broadening out in interspaces 6 and 5 and ending in a point in interspace 3, inwardly sharply defined and outwardly diffused; a dusky black subterminal line, broadest at the costal end, between which and the discal yellow band the colour is much brighter than the basal half; termen bordered with dusky black and separated from the subterminal dark band by a narrow band of the ground colour, except near the costa where it joins it. *Underside*: olive green; the base of forewing and nearly the whole of the hindwing tinted with blue. Forewing: markings in cell as on upperside: a short streak below base of vein 2; a transverse series of white spots as on upperside, inwardly bordered with black; preapical spots and subterminal dark line as on upperside, but the latter narrower and better defined and ending in a large dark purplish black spot in interspace 1; the middle of interspace 2 and outer two-thirds of interspace 1 dusky purple. Hindwing: a circular black mark at base of interspace 7; a short curved streak at base of interspace 6, another straight black mark at base of interspace 5; two narrow black lines across the cell and two more on either side of the discocellulars; a curved discal band as on upperside but paler and narrower and continued into interspace 2; both edges defined sharply with olive green; a subterminal olive green narrow line, sometimes forming detached linear spots in the male.

Antennæ black. Eyes dark brown. Palpi pale olive brown above, whitish below. Hanstellum pale green. Body dark bronzy green above, bluish grey below, somewhat darker in the male.

Expanse: ♂ ♂ 3.1—3.2"; ♀ ♀ 3.4—3.57". Five males and three females of this rare butterfly were taken in August and September, during the past three years, at Yakama and Phesima in the Naga Hills at about 7,000'—8,000' and a single male on Kabur Peak, Manipur, 8,400' in August.

This very distinct species can be at once distinguished from its nearest allies *D. nara* and *D. sahadeva* by the conspicuous and continuous curved band on the hindwing.

Capt. Evans in vol. xxii. of the Journal, p. 282, mentions a *Dophla*, secured by Mr. Ollenbach in the Khasi Hills, as referable to this species. I have not seen the specimen he refers to but I doubt this being so; the forewing of *D. curvifascia* is certainly very like that of *D. sahadeva*, but besides the spots being smaller, the spots in interspace 2 is very diffuse and not clearly defined as in *D. sahadeva*. The hindwing however is very different to *D. duda* ♀. The colour is bronzy green, whereas in *duda* ♀ it is very dark olive green; the discal band in *duda* is white outwardly bordered with blue; in *curvifascia* it is yellow and not bordered with blue and has the edge of the band on underside showing through. The band is moreover of a different shape being much hollowed out in the middle; in *duda* it is only slightly curved.

DOPHLA SAHADEVA, Moore.

There are two well marked forms of the female which do not seem to intergrade:—

- (a) A pale form with three spots on hindwing; this is the prevailing form.
- (b) A larger and darker form; forewing rather more outwardly produced at apex; spots more elongated and slightly tinged with very pale blue. Hindwing: *Upperside*: only two spots near costa. *Underside*: discal spots distinctly bluish; the termen also is squarer at vein 4.

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The two forms placed side by side appear very different but undoubtedly belong to the same species.

DOPHLA IVA, Moore.

Three males and a female of this rare butterfly were taken by my Native collectors at Kirbari, Naga Hills, at 6,000 ft., in July, August and September.

DOPHLA TAOOANA, Moore.

Two males in perfect condition taken on Cachar Road, Manipur, at the end of April or beginning of May.

This is a very interesting capture as it has previously not been recorded further north than the Hills of Lower Burma.

EUTHALIA COCYTUS, Fabr.

Several males taken at Sebong on the Burma Road, Manipur, in March, April, October and November. I believe this species has not been recorded so far north before.

EUTHALIA SEDEVA, Moore.

Both *E. sedeva* and *E. appiades* occur in Manipur but do not fly together. *E. sedeva* is confined to the Western Manipur Hills and *E. appiades* to the Eastern Manipur Hills.

E. adima was not met with.

EUTHALIA JAPROA, n. sp. (Pl. III, Fig. 22 ♂).

Male. *Upperside*: dark olive green. Forewing: Cell paler green than the ground colour and crossed by two dark broad bands; a subterminal row of white spots with diffused edges inwardly bent at interspace. Hindwing: a very indistinct broad discal band of slightly paler colour with iridescent greenish reflections somewhat brighter towards the tornus; a subterminal row of pale spots as on forewing but closer to the termen, large and white towards the apex, small and pale green towards the tornus; dorsum very pale green. *Underside*: bluish white with iridescent green reflections; two black broad bars crossing cell of forewing; a similar bar crossing cell of hindwing at its middle and a black spot near its base and another at the base of interspace 7; a very broad dark discal band, commencing in interspace 2 of forewing and continued to near tornus of hindwing where it ends in a point, purplish black on forewing and suffused with greenish reflections on the hindwing; its inner edge very dark and sharply defined in interspaces 4, 5, 6 and 7; inner edge below this and entire outer edge much paler and very diffuse; the subcostal area of forewing and subterminal area of hindwing suffused with iridescent green; a subterminal row of pale spots on both wings as on upperside but not so distinct becoming obsolescent towards the tornus; a terminal dark area narrow on the hindwing becoming broader towards the apex of the forewing.

Antennæ dark brown above and below; club below yellow brown.

Body dark green above; greyish bluish white below.

Expanse: 3.42".

A very distinct species; its nearest ally appears to be *Euthalia francie* which, however, is quite different.

A single specimen was taken by my Native collector above Phesima, Naga Hills, at 6,000' in a nullah below Japro Peak.

BHAGADATTA AUSTENIA, Moore.

Only the wet-season form appears to have been described. The dry-season *female* differs from the wet-season *female* in being larger. *Upperside*: paler brown; post discal and subterminal bands much paler; subterminal lunules on forewing conspicuously whiter and on hindwing in one specimen outwardly bordered with white. *Underside*: ground colour paler; brown markings darker.

Two females obtained near the Lengha and Irang Rivers, on the Cachar Road, Manipur, in April and May.

Many males and five females of the wet-season form were obtained at Kirbari, Naga Hills, at about 6,000' from July to September. It is by no means a common butterfly.

BHAGADATTA AUSTENIA PURPURASCENS, sub-sp. nov.

Under the above name I propose separating the form of *austenia* which occurs in the Abor Hills, and which differs from Naga Hills specimens in having on the *upperside* of the males the ground colour strongly suffused with purple; and in having the subterminal lunules, in both sexes, from apex of forewing to interspace 3 much whiter and more distinct. *Underside*: the markings in both sexes are darker and stand out more clearly.

Female. *Upperside*: as in typical form. *Underside*: as in male.

The intensity of the purple suffusion is somewhat variable; five out of my eight specimens have it more marked than the other three. In the *typical* form this suffusion is only faintly discernible and sometimes absent; in no specimens before me is it nearly as intense as in any of the Abor Hills forms. Eight males and a female were taken by Captain Porter on the Dihang River, Abor Hills, at about 3,000' in June and July and kindly presented by him to me.

ATHYMA LARYMNA, Doubleday.

Five males and a female were taken near Sebong, Manipur, in March and July respectively.

This is an interesting capture, for although Westwood recorded it from Northern India, de Nicéville thought this to be probably incorrect and did not include it in his "Butterflies of India." Bingham gives its habitat as the Malayan Subregion, extending into Tenasserim.

NEPTIS NEMORUM PHESIMENSIS, sub-sp. nov. (Pl. III, Fig. 24).

Very close to *N. nemorum*, Ch. Oberthur, but differs from the original figure in the "Études de Lépidoptérogie comparée," pl. viii, fig. 3, 1906, in having on the *underside* all the brown markings much darker with a purplish black tinge. Forewing with yellow markings very similar. Hindwing: the median yellow band much broader; the post median brown band also slightly broader and the terminal broad yellow area consequently narrower, which moreover is not bordered inwardly with dark brown as in the typical form. Interspaces 6 and 7 nearly entirely suffused with purple.

Expanse: ♂♂ 2.45—2.6".

Eighteen males were taken by my Native collectors from the middle of May to the beginning of June, in a nullah near Yakama, Naga Hills, at about 6,000'.

NEPTIS KIRBARIENSIS, n. sp. (Pl. III, Fig. 19 ♂).

This may possibly be a race of *N. cydippe*, Leech, from Central and Western China, but from Seitz's figure of which it differs in the following respects:—

Upperside: yellow markings much paler and buffy yellow slightly darker near the edges. Forewing: preapical and post median spots much larger.

Hindwing : discal band much broader, narrow at dorsum broadening out at its middle. *Underside* : markings lighter. Forewing very similar but spots in interspaces 1-a and 1 large and joining on to spot in interspace 2 ; markings almost white with a pinkish tinge. Hindwing : discal band white with a pinkish tinge and much broader especially so towards costa, outer edge even and not broken at vein 6 ; the brown area below it confined towards the middle where it is outwardly produced as vein 4 crossing the white subterminal band ; subterminal band white and much more distinctly marked.

A single male was taken at Kirbari, Naga Hills, at 7,000' at the end of June.

Expanse: ♂ 2.78".

NEPTIS ASPASIA, Leech.

A single male of this species was taken by my Native collector at Kirbari, Naga Hills, at about 7,000' in June.

It differs from Seitz's figure of *aspasia* on *upperside* forewing in having the preapical yellow spots larger and the dorsal spot also larger, the lower one being inwardly produced as far as the dip on angle in the dorsum. On the hindwing the median band is much broader ; subterminal band paler and also slightly broader. On the *underside* the hindwing differs in having the subterminal pale violet band half as narrow ; vein 7 and base of veins 6 and 8 lined with violet.

N. aspasia is a Chinese insect and has not previously been recorded from within Indian limits although recently a single specimen has been recorded by South as having been taken by Captain Bailey at Rima in S. E. Tibet close to the Mishmi Hills border. (J. B. N. H. S., vol. xxii, page 357.)

NEPTIS ANTILOPE, Leech.

Two males and two females were obtained at Kirbari, Naga Hills, at about 7,000', in June and July.

These specimens differ from Seitz's figures as follows:—

Upperside : spots in interspaces 2 and 3 of forewing larger and squarer as in *N. melba*, Evans ; in the figure they make one rather small round spot.

Underside : Forewing : preapical spots separate, the lower one white ; subterminal dark narrow line continuous, reaching the costa ; oblique dark brown band reaches right across the wing from the costa to the middle of the termen, in the figure it stops short of the subterminal dark line leaving the terminal area unmarked. Hindwing : discal band whitish, narrow at the dorsal end and broadening out towards the costa, in the figure of *antelope* it is the reverse, being widest at the dorsal end and narrowing towards the costa ; the dark post discal band is chocolate outwardly tinted with yellow with a violet band in its centre ; in the figure of *antelope* it is quite different. There is also a terminal dark line which is wanting in the figure. The Naga Hills form may prove to be a western race of *N. antelope*.

NEPTIS NARAYANA NANA, de N.

A single male taken at Kirbari, Naga Hills, 7,000' in September. It agrees very well with a specimen in the de Nicéville collection.

Ab. naga, n. a single male of what appears to be an aberration of *nana* was taken at Kohima, Naga Hills, at 7,500' in August. It differs from the typical form as follows:—*Upperside* : Forewing : all markings white except the preapical spots which are outwardly yellow. Hindwing : discal band white except near the costa where it is tinged with yellow ; cell streak on forewing broader. *Underside* : Hindwing : the double subterminal band broader and indistinct ; the terminal violet band also very indistinct.

NEPTIS NAMBA, n. sp. (Pl. III, Fig. 20 ♂).

Very near to *N. ananta* from the Naga Hills but differs constantly, in both sexes, in being much darker above and below.

Female. *Upperside*: all the markings conspicuously broader and darker than in ♀ *ananta* for the Naga Hills. *Underside*: darker, otherwise similar.

Expanse: ♂ 2.35—2.7"; ♀ 2.8."

This form is readily distinguished from *N. ananta* by its much darker yellow bands on the upperside and by its richer brown red on the underside. It flies at the foot of the Hills; whereas *N. ananta* flies at a much higher altitude; in the rains *N. ananta* is found at 5,000—7,000 ft. and in the cold weather it descends to about 2,600 ft.

Many males and one female were taken by my Native collectors at Michuguard in the Naga Hills and on the Burma and Cachar Roads in Manipur from March to October. Two males were also received from Mr. Antram taken near Silchar. The seasonal forms do not appreciably differ.

In my notes on Naga Hills butterflies, J. B. N. H. S., vol. xxi, p. 61, I erroneously recorded this species as the wet-season form of *N. ananta*; it is, however, perfectly distinct.

RAHINDA PAONA, n. sp. (Pl. III, Fig. 23 ♂).

Male and female. *Upperside*:—black with rather pale yellow markings. Forewing: a yellow streak in cell broadening out at apex, almost reaching the base of vein 5 and bordered by that vein for some distance and ending in a point on vein 4; base of interspace 3 filled with yellow; a preapical row of contiguous spots in interspaces 5, 6, 8 and 9, the upper one minute and sometimes wanting; two subterminal yellow spots in interspaces 1 and 2, well separated from one another; the lower one small extending into interspace 1-a and reaching the dorsum; the upper one large extending across the interspace and just entering interspace 3. Hindwing: a broad yellow discal band from dorsum to vein 7; a narrow subterminal band of the same colour irrorated with fuscous scales, obsolescent towards costa. *Underside*: Forewing: dull black slightly tinged with brown red; yellow markings as on upperside but rather larger; costa at base, apical area and terminal area towards tornus yellowish; a subterminal chestnut line commencing at the costa well before the apex and ending at vein 1. Hindwing: costal interspace yellow at basal half; a broad antemedian yellowish green band streaked with chestnut and outwardly bordered with black towards the dorsum; a yellow discal band broadening out towards the costa; its outer edge broadly bordered with black; a broad postmedian greenish yellow band divided by a narrow chocolate line of detached streaks; a narrow pale yellow subterminal line violet towards the apex and outwardly bordered by a narrow dark chestnut line; a greenish yellow terminal band outwardly edged towards the apex by a narrow anteciliary purplish line.

Expanse: ♂ 1.82—1.88"; ♀ 1.97—2.22".

Two males and two females were obtained by my Native collectors at Kirbari, Naga Hills, at about 7,000' in June and July.

CHERSONESIA RAHRIA RAHRIODES, Moore.

A few males obtained at the foot of the Naga Hills, near Nichuguard, in October and November. A few males and a female obtained at Sebong, Manipur, in October and April, and a female on the Irang River, Cachar Road, Manipur, in February. The males taken in October show great variation in size and depth of colour. Bingham places this form as a race of *C. risa*, Doubleday, but I think there is no doubt that it is a perfectly distinct species.

SYMBRENTHIA SILANA, de N.

Seven males and two females of the w. s. f. were obtained at Kirbari Naga Hills, at about 6000' in July, August, September and October. Thirteen males of the d. s. f. were obtained near Sebong, Eastern Manipur Hills, and on the Irang River, Western Manipur Hills, at low elevations in February, March and April. This very distinct species can at once be distinguished from *S. niphanda* on the *upperside* by the much broader yellow markings and on the *underside* by (1) all the dark markings appearing very much darker; (2) the much broader band of the *ground colour* separating the subterminal cones from the terminal markings; (3) the very irregular anterior edge of the terminal lunules in interspaces 2 and 3.

S. silana is considered by some authors to be a race of *S. niphanda* and by others to be the d. s. f. of that species. I believe it is undoubtedly a good species. I have a single d. s. f. of *S. niphanda* taken at Phesima in the Naga Hills in April which only differs from the w. s. f. in having the cones on the underside of the hindwing half the size and the pale discal band rather broader.

The d. s. f. of *S. silana* only differs from the w. s. f. in being rather smaller and in having the rufous bands on the *upperside* if anything slightly broader. On the *underside* the green of the subterminal cones on the hindwing is carried on to the forewing, being distinct in interspaces 3 and 4, less so in 2, 5 and 6. On the *upperside* hindwing there is also sometimes a distinct fine reddish terminal line.

The type which is in the de Nicéville collection has the cones and lunules on the *underside* of the hindwing *metallic blue*, but it is aberrant in this respect, the remainder of the specimens in the collection and all my specimens have it very dark *bluish-green*.

CIRRHOCHROA AORTIS, Doubleday.

An hermaphrodite of this species was taken by Captain Porter on the Dihang River, Abor Hills, in June, and kindly presented by him to me.

The left pair of wings and left foreleg are male in character whilst the right pair of wings and right foreleg are female. I have not examined the genitalia very carefully but they appear to be male.

CALINAGA ABORICA, n. sp. (Pl. III, Fig. 21 ♂).

Male. *Upperside* black with pale cream coloured markings. Forewing: two narrow pale streaks, irrorated with fuliginous scales, occupying basal half of the cell and joined together towards the base; the lower streak the longer of the two; two short contiguous similarly coloured streaks, placed one above the other, towards the end of the cell, between which and the bases of veins 3 and 5 are two more very indistinct pale spots; a broad pale streak, bifurcated at its outer half, in interspaces 1, commencing at the base and extending well beyond the base of vein 2, the lower portion the longer; a long narrow pale streak at base of interspace 4; a discal row of narrow pale streaks in interspaces 2—6; a subterminal row of pale cream spots in interspaces 1—6, interspace 1 having two spots; and lastly a terminal row of very indistinct spots in interspaces 1—4. Hindwing: a broad pale streak in cell, commencing at the base and not quite reaching the end, the outer two-thirds bifurcated and dusted with fuliginous scales, the upper portion a little longer than the lower; two pale streaks dusted with fuliginous scales at base of interspaces 4 and 5; a discal row of pale spots in interspaces 1—3 and 5—7, the first very small and indistinct, those in interspaces 5 and 6 long and linear; a subterminal row of large pale spots in interspaces 1—6; basal half of interspaces 1-b and 1-a pale cream; dorsal half of wing densely covered with

long grey hairs. *Underside*: pale markings as above but much broader and distinct; the subterminal row of pale spots on hindwing continued into interspace 1-6.

Body *above* black, sides of body at junction of the forewings red; *underneath* black, red near base of hindwings.

Antennæ black; eyes brown.

Expanse: ♂ 3.5—3.62".

Two males were obtained by Captain Porter on the Dihang River, Abor Hills, in June and July, and kindly presented by him to me.

Its nearest ally appears to be *C. saka*, Moore, with the figure of which it agrees in having the white area in basal half of cell, forewing, divided by a black streak; but differs in the following respects:—

Upperside: much darker. Forewing: cell almost entirely black with only faint traces of white; discal spots smaller; base of interspace 1 pure cream colour. Hindwing: white area in cell very restricted and distinctly divided; the lower portion not as long as upper portion; all the markings smaller: interspaces 1-a and 1-b not entirely white, the outer halves being black. Thorax above black, the red hairs being confined to the sides of the body: the lower discocellular of cell of hindwing distinctly concave and not straight, ending at the junction of veins 3 and 4 and not above it.

It is quite different to *C. davidis*, from Western China, of which I have two specimens before me.

Family—NEMEOBIDÆ.

DODONA DEODATA LONGICAUDATA, de N.

A single female taken at Gaspani, Naga Hills, 1,500' in October is very close to Bingham's figure of *longicaudata*, F. of B. 1. Butterflies, vol. 1, p. 488, fig. 88, which is probably a wet-season form.

A male taken on the Cachar Road, Manipur, in December, and a female taken near the same place in November agree with deNicèville's type; a female taken with the above female has the white bands broader and agrees exactly with Elwes' figure of *D. deodata* from the Karen Hills; P.Z.S., 1891, Plate XXVII.

D. longicaudata is certainly a race of if not typical *D. deodata* itself; specimens of the latter in the de Nicèville collection have the white bands, which are somewhat variable in width, rather broader than the dry-season form of *longicaudata* and are probably extreme dry-season forms.

TAXILA HAQUINUS FASCIATA, Moore.

Occurs not uncommonly near Sebung at the foot of the Eastern Manipur Hills from February to April. A pair were also taken at the same place in October. I have taken this form at the foot of the Lushin Hills near the Cachar border.

ABISARA ATTENUATA, n. sp. (Pl. II, Fig. 15 ♂).

This may prove to be a race of *Ahisara atlas* from Java. It differs from *atlas* in having the discal band much narrower and curved inwards at the costa, in *atlas* it curves outwards at the costa.

A single specimen was taken on the Barak River, Western Manipur Hills, in March.

ABISARA ECHERIUS, Stoll.

Numerous males and three females, and which agree almost exactly with specimens in the Indian Museum ticketed *echerius* from China, were obtained near Sebung in October, November and January.

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A. angulata, Moore, which occurs abundantly in the Manipur Valley is a very different looking insect and will prove to be a good species and not a race of *echerius*.

Family—PAPILIONIDÆ.

PAPILIO DOUBLEDAYI CACHARENSIS, Butler.

Not uncommon on the Barak and Irang Rivers in the Western Manipur Hills. Dry-season forms were taken from February to April and wet-season forms from July to October. *P. cacharensis* appears to have been described from the wet-season form; the dry-season form which has all the white markings much larger is almost identical with *P. doubledayi*.

PAPILIO KABRUA, n. sp.

Very close to *P. polla*, de N. and *P. latreillei*, Don., from the former it differs in the following respects:—

Male. Forewing: proportionately broader, in this respect resembling *P. latreillei*. Hindwing: white spot in interspace 5 on both sides much smaller; cilia between tornus and apex of vein 3, at apex of tail and at apex of vein 5 black and not vermilion red, in this respect again resembling *P. latreillei*. The outer edges of the white spots on the hindwing almost straight and not deeply excavated as in *P. polla*.

Female. Forewing: similar in shape to that of *P. polla* ♀. White spots on hindwing as in male but outer edges even straighter; cilia black as in male.

From *P. latreillei* ♂ it differs on the hindwing in having an additional large white spot in interspace 5 and the spot in interspace 4 completely filling the base of that interspace. On the *upperside* there is no trace of a subterminal white spot in interspace 6; this spot is also generally wanting on the underside but is sometimes present.

Expanse: ♂ 4.64"; ♀ 4.5—5.36".

A single male taken at Yakama, Naga Hills, at about 7,000 ft. in June and nine females taken in Manipur at 5,000—8,400 ft. in May and June.

PAPILIO POLLA, de N.

Two males taken at Saitu, Manipur, in May and a female at Poona, Naga Hills, at 8,000 ft. in June. Both this species and *P. kabrua* appear to be single brooded and are only on the wing in May and June.

Expanse: ♂ 5.28—5.7"; ♀ 5.36".

PAPILIO CRASSIPES, Oberthur.

Seven males and one female were obtained in the Western Manipur Hills at about 3,000 ft. in March and June and two males at the head of the Manipur valley at 3,300 ft. in July and September, also two males at Nichuguard, Naga Hills, in April.

Expanse: ♂ 4.46—4.94"; ♀ 5.3".

PAPILIO ALCINUS IMPEDIENS, Rothschild.

Many males and several females of a form of *P. alcinus* which agree fairly well in the Seitz's figure of *P. impediens*, Rothschild, were taken by my Native collectors near Kohima in the Naga Hills during May and the beginning of June at 7,000'; and three males in the Zulla Valley in June. Many of the specimens were unfortunately badly damaged and probably fresh specimens will be found flying at the beginning of May.

I am unable to say without comparison with the type whether the present form is typical *P. impediens* or is another race of the variable *P. alcinus*.

The male only differs from Seitz's figure of *impediens* in having only *one* small red spot at the tornal angle on upper hindwing instead of *four* large spots. The female is very pale brown with all the spots complete as in Seitz's figure of the male but larger and pink in colour. It is quite distinct from *P. pembertonii*, Moore.

Expanse : ♂ 4.22—4.98" ; ♀ 5.3—5.6".

PAPILIO SLATERI, Hewitson.

Occurs commonly at Nichuguard in the Naga Hills in March and April. Many males were taken on the Irang River, Western Manipur Hills, in March and a few in April. A few males and a female were also taken near Sebung on the Burma border in March. These latter specimens differ slightly from the forms taken on the Irang River and at Nichuguard in having on the underside of the hindwing a terminal and a subterminal row of linear spots, the latter well removed from the termen and quite separate from the terminal row. In the Irang River and Nichuguard specimens there is only a terminal row of spots sometimes very distinct and often completely absent.

PAPILIO PARADOXUS TELEARCHUS, Hewitson.

A single specimen of the rare ♀ mimicking the ♀ of *E. mulciber* and several ♂ were obtained on the Irang River, Western Manipur Hills, in March and May.

PAPILIO JANAKA, Moore.

Two males were taken by Captain Porter on the Dihang River, Abor Hills, and kindly presented by him to me. This is an interesting capture as it has not previously been recorded further east than Sikkim. Rothschild thought that this form and *P. bootes* would probably mix with one another in Bhutan, Nov. Zool. ii, 1895, p. 336. The Abor Hills form is however undoubtedly typical and so specimens from intermediate localities will also probably be typical.

PAPILIO MIXTA, n. sp.

Under this name I record a form closely allied to *P. bootes* and *P. janaka*. The male agrees with *P. janaka* in having four white discal spots on the hindwing and in the tornal red spot being conspicuous; it agrees with *P. bootes* in lacking the subterminal series of red lunules in interspaces 3, 4 and 5, in one specimen there is a trace of a lunule in interspace 4, on the upper hindwing; and on the underside in the basal red area not being continued along the dorsum of the hindwing. The female is like the male but has the discal white spots larger and has additional red lunules in interspaces 3 and 4.

Three males were taken at Yakama, Naga Hills, at about 6,000' in May and two females on Kabru Peak, Manipur, 8,400' in June.

Typical *P. janaka* occurs in the Eastern Himalayas from Sikkim to the Abor Hills. Typical *P. bootes* occurs in the Khasia Hills. *P. mixta*, Mihi, occurs in the Naga and Manipur Hills.

As far as is known these three forms do not intergrade in the above given localities. Typical *P. janaka* and typical *P. bootes* however are also said to occur and fly together in the Western Himalayas and are recorded by Mackinnon and de Nicèville from Tehri Garhwal "J. B. N. H. S., vol. xi, p. 593." Mr. Hannington records *P. janaka* from Loharkhet in Kumaon "J. B. N. H. S., vol. xx, p. 361," but does not mention whether it is typical or not.

NOTES ON BUTTERFLIES FROM THE NAGA HILLS. 515

A third form from the Western Himalayas was taken by myself at Loharjang in Western Garhwal, at 6,500' in May, which does not agree with either typical *P. janaka*, *P. bootes*, or with *P. mixta*, Mihi, and which I propose naming *P. kala*.

P. KALA, n. sp.

Male. *Upperside*: on the hindwing there are three white discal spots in interspaces 2, 3 and 4, both above and below, and there is a subterminal series of red lunules in interspaces 1—4 as in *P. janaka* but smaller; the tornal one does not coalesce with the admarginal one as it sometimes does in that species. *Underside*: the hindwing agrees with *P. bootes* in having the red basal area confined to the base and not produced along the dorsum as in *P. janaka*. It differs from both *P. janaka* and *P. bootes* in having the tail completely black and not spotted with pinkish white as in those two species resembling in this respect *P. bootes nigricans*, Rothschild.

P. janaka, *P. mixta*, mihi, and *P. kala*, mihi, will probably prove to be conspecific with *P. bootes*, which in the Eastern Himalayas, in the Khasia Hills, and in Manipur and the Naga Hills has developed into well marked and constant forms whilst in the Western Himalayas it is still inconstant and is represented by three distinct forms, viz., typical *janaka*, *bootes* and *kala*, mihi.

PAPILIO KRISHNA, Moore.

A single male taken above Yakama, Naga Hills, in May. It is much rarer in these Hills than it is in Manipur. It appears to be single brooded.

PAPILIO ARISTEUS ANTICRATES, Doubl.

Several males of this form were taken in March at Sebung in the Eastern Manipur Hills and in the Kabor Valley, Burma, about fifteen miles from Sebung, flying with *P. aristeus hermocrates*, which was the prevailing form occurring somewhat commonly.

P. ARISTEUS HERMOCRATES, Felder.

A single male was taken at Nichuguard in the Naga Hills, in May, where the prevailing form *P. aristeus anticrates* occurs commonly in March and April.

LEPTOCIRCUS MEGES INDISTINCTA, Tytler.

Occurs rather rarely in the Manipur Hills. Several females which differ in no way from the males were obtained in the Naga Hills. This sex appears to be exceedingly rare.

TEINOPALPAS IMPERIALIS, Hope.

Occurs very commonly in the Manipur Hills at high elevations. A few females were taken on Kabru Peak from May to July. The spring females are somewhat smaller than those taken in the rains.

Family—PIERIDÆ.

PIERIS BRASSICÆ, L.

During the years 1911 and 1912 I only obtained a single male in Manipur; but during the present year 1913 this butterfly simply swarmed in my garden from March to May; the caterpillars doing great damage in the kitchen garden. The walls of my bungalow were favourite places for the caterpillars to pupate on and hundreds of pupæ could be seen hanging from them in sheltered spots.

(To be continued.)

THE PALMS OF BRITISH INDIA AND CEYLON. INDIGENOUS AND INTRODUCED

BY

E. BLATTER, S.J.

PART XII.

(With Plates *LXIX—LXXIV.*)

(Continued from page 281 of this Volume.)

ACANTHOPHGENIX, Wendl. in Fl. des Serres, t. 181.

(Etym.: From the Greek "acantha," a thorn or prickle, and "phœnix", a palm.)

Balf. f. in Baker, Fl. Maurit. 384; Mart. Hist. Nat. Palm, III, 174, t. 154, 155, fig. 1 (*Areca crinita*) et 176, t. 154, 155, fig. 2 (*A. rubra* excl. descript. et ic. fruct) Benth. and Hook. Gen. Pl. III, II, 898, 32.

Palms of moderate height, armed, caudex stout, annulate. Leaves terminal, equally pinnate, with complete, basal, spiny sheaths; midrib grooved on each side above attachment of the pinnæ; pinnæ strongly reduplicate, many-nerved, with scales and fine bristles on the undersurface; midvein with a few bristles on the upper surface.

Flowers monœcious in spirally disposed 3-flowered clusters, slightly immersed in the branches of a twice-branching slightly drooping spadix, the female flower below and between two males. Spathes two. Male flowers asymmetrical, trigonous-compressed. Sepals small, orbicular, carinate, imbricate. Petals obliquely ovate or ovate-lanceolate, acuminate, valvate. Stamens 6 or more, exserted, filaments free, elongate, cylindric, acute at the apex, incurved; anthers linear-oblong or globose, dorsifixed, versatile. Pistillode elongate-conical or 2-3-fid. Female flowers smaller, broadly ovate. Sepals ovate-orbicular, concave, broadly imbricate, petals as long as the sepals, orbicular, striate-nervose. Stamines obscure. Ovary obovoid-oblong, straight or curved, 1-(or 2-3-) locular; stigma subapiculate, ovule parietal, pendulous.

Fruit small, globose or oblong, terete or compressed, stigmas lateral or subbasilar; mesocarp thin fibrous; endocarp subcrustaceous. Seed oblong, ascending, laterally slightly compressed; branches of the raphe spreading from the hilum, and anastomosing on the opposite side of the seed; albumen homogenous; embryo basilar.

SPECIES.—About 4.

DISTRIBUTION.—Mascarene Islands.

Fruit globose.. .. .	<i>A. rubra.</i>
Fruit oblong-cylindric.....	<i>A. nobilis.</i>

ACANTHOPHŒNIX RUBRA, Wendl. in Fl. des Serres, XVI., 181; Baker Fl. Maurit and Seysh, 385.—*Areca rubra*, Bory Voy., I., 306; Willd. Spec., Pl. IV., 596, n. 9; Poir. Encycl. Suppl. I., 441, n. 10; Spreng. Syst. Veg., II., 139, n. 8; Mart. Hist. Nat. Palm, III., 180 (excl. descript fructus).—*Calamus verschaffeltia*, Hort.

NAME.—Palmiste rouge (French).

Rote Dornen-Areka (German).

DESCRIPTION.—Stem 60 feet high. Leaf 6-12 feet long; petiole glabrous, 2-4 inches long; leaf-sheath $2\frac{1}{2}$ - $4\frac{1}{2}$ feet long, thickly covered with long brown-black spines; pinnæ slightly glaucous beneath. (Young plants have dark-green leaves with red veins).

Spadix $2\frac{1}{2}$ - $3\frac{1}{2}$ feet long; peduncle 6-10 inches long, like the lower part of the branches armed with straight spines; branches

NOTICE.

Owing to the War the Black and White Plates Nos. LXIX-LXXIV which accompany this paper have not arrived. We hope to publish these either in the next Journal or the Index number.

EDITORS.

Areka.

DESCRIPTION.—80-120 feet high, 10-14 inches in diameter. Leaves 9-14 feet long; petiole 1 foot long, pale green, smooth; sheath 3-6 feet long, usually spiny; leaflets hairy beneath, bristly on both surfaces when young; midrib yellow.

Spadix 2-6 feet long, shortly peduncled, slightly amplexicaul; branches very slender, pendulous; peduncle vertically compressed, much thickened at the base. Spathes 2, complete, seldom over 1 foot long, densely covered with flexuose yellow black-tipped spines.

Male flowers.—Perianth minute, the inner segments ovate, acute, valvate. Stamens 9, connate, equal in length to the inner segments; anthers globose. Pistillode and angular trifid column.

Female flowers.—Segments of perianth imbricate. Stamens represented by a minute-toothed cup.

Fruit oblong-cylindric, $\frac{1}{2}$ inch long, $\frac{1}{6}$ inch thick, black. Stigma subbasilar; mesocarp fibrous; endocarp crustaceous. Seed erect;

THE PALMS OF BRITISH INDIA AND CEYLON.
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PART XII.

(With Plates LXIX—LXXIV.)

(Continued from page 281 of this Volume.)

ACANTHOPHENIX, Wendl. in Fl. des Serres, t. 181.

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ed, maments tree, elongate, cylindric, acute at the apex, incurved; anthers linear-oblong or globose, dorsifixed, versatile. Pistillode elongate-conical or 2-3-fid. Female flowers smaller, broadly ovate. Sepals ovate-orbicular, concave, broadly imbricate, petals as long as the sepals, orbicular, striate-nervose. Stamynodes obscure. Ovary obovoid-oblong, straight or curved, 1-(or 2-3-) locular; stigma subapiculate, ovule parietal, pendulous.

Fruit small, globose or oblong, terete or compressed, stigmas lateral or subbasilar; mesocarp thin fibrous; endocarp subcrustaceous. Seed oblong, ascending, laterally slightly compressed; branches of the raphe spreading from the hilum, and anastomosing on the opposite side of the seed; albumen homogenous; embryo basilar.

SPECIES.—About 4.

DISTRIBUTION.—Mascarene Islands.

Fruit globose.....*A. rubra*.
Fruit oblong-cylindric.....*A. nobilis*.

ACANTHOPHŒNIX RUBRA, Wendl. in Fl. des Serres, XVI., 181; Baker Fl. Maurit and Seysh, 385.—*Areca rubra*, Bory Voy., I., 306; Willd. Spec., Pl. IV., 596, n. 9; Poir. Encycl. Suppl. I., 441, n. 10; Spreng. Syst. Veg., II., 139, n. 8; Mart. Hist. Nat. Palm, III., 180 (excl. descript fructus).—*Calamus verschaffeltia*, Hort.

NAME.—Palmiste rouge (French).

Rote Dornen-Areka (German).

DESCRIPTION.—Stem 60 feet high. Leaf 6-12 feet long; petiole glabrous, 2-4 inches long; leaf-sheath $2\frac{1}{2}$ - $4\frac{1}{2}$ feet long, thickly covered with long brown-black spines; pinnae slightly glaucous beneath. (Young plants have dark-green leaves with red veins).

Spadix $2\frac{1}{2}$ - $3\frac{1}{2}$ feet long; peduncle 6-10 inches long, like the lower part of the branches armed with straight spines; branches stout, subtended by linear-lanceolate bracts; spathes $1\frac{1}{2}$ - $2\frac{1}{2}$ feet long, with a few straight spines on the inside near the base. Perianth reddish-brown.

Fruit globose, $\frac{1}{3}$ - $\frac{2}{3}$ inch in diameter, with a prominent ridge extending from the stigma to the base.

HABITAT.—Mauritius, rare, Bourbon. Cultivated in gardens.

CULTIVATION IN EUROPE.—A very elegant stove palm. It requires a light sandy soil and a temperature of 65° — 80° in summer, and 55° — 65° in winter. Propagation is effected by seeds only, which germinate best in a moist bottom heat, and a well decomposed compost of one part loam, one of peat, one of leaf-mould, and the remainder of sand. They may be left in this soil for two or three years.

ACANTHOPHŒNIX NOBILIS, Benth. and Hook. f. in Gen. Pl. III, II, 398, 32—*Deckenia nobilis*, Wendl. in Gard.Chron., 1870, p. 561; Balf. f. in Baker Fl. Maurit.

NAMES.—French: Chou palmiste. German: Vornehme Dornen-Areka.

DESCRIPTION.—80-120 feet high, 10-14 inches in diameter. Leaves 9-14 feet long; petiole 1 foot long, pale green, smooth; sheath 3-6 feet long, usually spiny; leaflets hairy beneath, bristly on both surfaces when young; midrib yellow.

Spadix 2-6 feet long, shortly peduncled, slightly amplexicaul; branches very slender, pendulous; peduncle vertically compressed, much thickened at the base. Spathes 2, complete, seldom over 1 foot long, densely covered with flexuose yellow black-tipped spines.

Male flowers.—Perianth minute, the inner segments ovate, acute, valvate. Stamens 9, connate, equal in length to the inner segments; anthers globose. Pistillode and angular trifold column. Female flowers.—Segments of perianth imbricate. Stamens represented by a minute-toothed cup.

Fruit oblong-cylindric, $\frac{1}{2}$ inch long, $\frac{1}{6}$ inch thick, black. Stigma subbasilar; mesocarp fibrous; endocarp crustaceous. Seed erect;

raphe with 3-5 branches which ascend from the hilum and then spread over the surface; albumen homogeneous; embryo erect, basilar.

HABITAT.—Seychelles.

GARDENING.—*Acanthophaenia nobilis* is an elegant spiny palm with pinnated leaves and linear pointed leaflets, which are gracefully drooping at the point. There is an illustration of this palm in Gard. Chron., 1870, p. 561. The palm had first been called *Deckenia* by Wendland in honour of Baron von der Decken, the African explorer. It should not be confounded with *Deckeria*, a synonym of the American genus *Iriarte*.

ILLUSTRATIONS.—We reproduce on plate LXIX a group of *Verschaffeltia splendida*, Wendl., growing in the Botanic Gardens of Singapore. Mrs. Burkill was kind enough to take the photographs. The description of this species appeared in our last issue.

Plate LXX shows a fine specimen of *Acanthophaenia nobilis*, Benth. and Hook., photographed in a jungle of the Seychelles Islands.

ONCOSPERMA, Bl. in Rumph., t. 82, 103.

(Etym.: From the Greek "oncos," a tumour, and "sperma," seed, alluding to the shape of the seed.)

Mart. Hist. Nat. Palm. III, 112, t. 150, 153, f. 4, 5 (*Areca horrida*). Meissn. Gen. Pl. 355, Comm. 266 (*Kepleria*).—Griffith Palms Brit. Ind. 157, t. 233 B. C. (*Areca*, sect. *Euoplus*).—Scheff. Ann. Jard. Bot. Buitenz., I, 139, 159, t. 29, f. 3 et t. 30.—Benth. and Hook., Gen. Pl. III, II, 895, 28.—Linnæa 39, 186.—Hook., Fl. Brit. Ind., VI, 414.

Trunk tall, prickly, stoloniferous. Leaves terminal, equally pinnatisect, segments equidistant or sub-fasciculate, ensiform, acuminate, entire at the apex; rhachis furfuraceous; sheath elongate.

Spadix short-pedunculate, simply or twice branched, unarmed or aculeate; spathes 2, complete, as long as the spadices, caducous, ensiform, coriaceous, unarmed, or aculeate, the inner one bicristate. Flowers sessile, spirally crowded on the branches, the upper solitary, male, the lower ternate, a female between two males. Male flowers asymmetrical, trigonous compressed. Sepals small triangular-rotundate, acute, imbricate at the base. Petals obliquely ovate, acute or acuminate, valvate. Stamens 6-12; filaments short, straight or incurved at the apex; anthers linear, erect. Pistillode collumnar, split at the apex. Female flowers much smaller than the male, obliquely globose. Sepals unequal, rotundate, gibbous at the base, broadly imbricate. Petals slightly longer, orbicular, convolute-imbricate. Stamminodes minute, 6. Ovary broadly and obliquely ovoid, 1 or 3-locular, stigmas minute; ovule parietal, pendulous.

Fruit small, globose ; stigmas lateral or subbasal ; pericarp rumose or subfibrous, endocarp thinly crustaceous. Seed globose or subglobose ; raphe broad ; albumen deeply ruminant ; embryo near the hilum.

SPECIES.—About 6.

DISTRIBUTION.—Tropical Asia.

CULTIVATION IN EUROPE.—Stove Palms. They grow best in a compost of two parts loam, one of peat, and one of sand. A liberal supply of water is required. Propagation is effected by seeds or suckers.

ONCOSPERMA FASCICULATUM Thw. Enum. 328 (1864). Hook. Fl. Brit. Ind., VI., 415. Trimen, Fl. Ceylon, IV, 323; Scheff. in Ann. fard. Buitenz., I, 160.—*Caryota horrida*, Moon, Cat. 64 (non Willd.).

NAME.—Katu-Kitul (Ceylon).

DESCRIPTION.—Trunk 30-50 feet high, 5-6 inches in diameter, copiously armed with long, flexible, black, compressed spine, base thickened, stoloniferous. Leaves 8 feet long; leaflets 12-18 inches long, 1-1 $\frac{3}{4}$ inch broad, fascicled, lanceolate, caudateacuminate, tips drooping, scurfy beneath; rhachis scurfy; petiole spinous towards the base, sheath 2 $\frac{1}{2}$ feet, spinous, scurfy.

Spathes sparingly scurfy, unarmed, inner 2-crested. Spadix 2 feet long, unarmed, paniculately branched; peduncle very stout, branches drooping. Male flowers $\frac{1}{4}$ inch long, densely imbricate; sepals very small; petals acute, striate; stamens 9; filaments short, broad, fleshy; anthers linear. Female flowers scattered, $\frac{1}{6}$ inch in diameter. Sepals thick, forming a broadly 3-lobed cup; petals hardly longer than the sepals, coriaceous, broader than long.

Fruit globose, $\frac{1}{2}$ inch in diameter, black or purple, like large black currants.

HABITAT.—Ceylon. Steep forests in moist region, 1-5,000 feet; rather common. (Endemic in Ceylon.)

Flowers in February and March.

ONCOSPERMA HORRIDUM, Scheff. in Naturk. Fijdsch. Ned. Ind., XXXII, 189; Ann., fard. Buitenz., I, 159. *Areca horrida*, Griff. in Calc. Fown. Nat. Hist., V, 465. Palms Brit. Ind. 158—233C; Mart., Hist. Nat. Palm, III., 312. Hook., Fl. Brit. Ind., VI., 515. *Areca nibune*, Mart., Hist. Nat. Palm, 173, t. 150, f. 4.

NAME.—Bhyass (Malay Peninsula); Bijass-Palme (German).

DESCRIPTION.—Trunk 30-40 feet high, sending off stolons at the base, annulate; spaces between the rings much armed. Crown rather thin. Leaves 14-16 feet long, 5 feet broad, spreading in every direction. Sheaths leathery, 2 feet long, much armed. Petiole bearing leaflets nearly from the base, green, stout, flattened at the base, compressed at the apex, otherwise trigonal, covered with brown irregular scales, armed throughout, but specially underneath, with black-brown flat not very strong spines. Pinnules 2-3 feet long,

alternate or subopposite, very narrow, subulate-acuminate, coriaceous, dark-green, above keeled along the centre, with 2 lateral plaits on either side, spreading or oblique; a few scales attached by the middle extend along the central vein underneath.

Spathes 2 complete, acutely margined, coriaceous, armed with brown-black spines, outer 1-1½ feet long, of a greenish colour outside when mature, yellow and polished inside, inner cuspidate. Spadix axillary; peduncles stout, yellow, flattened at the base, much armed on the spaces between the insertion of the spathes, above these unarmed; branches 1-2 feet long; pendulous, flexuous, about equal, 2 or 3 times branched or simple. Male flowers: sepals 3, imbricate, carinate, submembranous; petals 3, valvate, subulate or almost setaceo-acuminate; stamens 6, sagittate; pistillode rather large of 3, sometimes 2, imperfect carpels. Female flowers: sepals imbricate, roundish-cordate; corolla conical in the bud; staminodes 6; ovary of 1 large complete carpel and 2 incomplete ones; no style; ovule anatropous, parietal.

Fruiting spadix: branches 2-4 feet long, pendulous, without spathes, each suffulted by a coriaceous acuminate broad-based bract; fruit sessile, spherical, ¾-1 inch in diameter, purplish-black, surrounded at the base by the perianth, oblique, the true apex being indicated by a mammilla on one side near the middle; epicarp coriaceous; fibres very few, endocarp membranous, seed round, attached by a broad base, whitish-brown, reticulate with white veins, hilum large; albumen horny, deeply ruminant.

HABITAT.—Malacca; common in densely wooded valleys and ravines, at Ching, and on wooded hills, at Laydang Soobubi, but rare; in woods at the base of Battoo Bakar; Borneo (Griffith); Sumatra.

NOTE—This species is very nearly allied to the species, *O. filamentosum*, and seems to differ from it only by its larger fruit which reaches up to one inch in diameter.

ONCOSPERMA FILAMENTOSUM, Bl., Rumphia, II., 97, t. 82, 103; Hook., f. Fl. Brit. Ind., VI, 414.—*O. cambodianum*, Hance. in Journ. Bot. (1876) 261.—*Areca tigillaria*, Jack., in Mal. Misc., II, VII, 88; Griff., in Calc. Journ. Nat. Hist., V., 463, et in Palms Brit. Ind., 157, t. 233 B.—*A. nibung*, Mart., Hist. Nat. Palm, III, 173, 311, t. 153.—*Areca nibung*, Griff., ex. H. Wend, 1. in Kerch. Palm, 231. *Keppleria tigillaria*, Meissn. Gen. (1842) 355.—*Oncosperma tigillaria*, Ridley, Fl. Singapore in Journ. Asiat. Soc. Straits, S. No. 33 (1900) 173.—*Areca spinose*, Hort.

NAMES—English: Nibung Palm.

German: Nibungpalme.

Jav.: Erang, Handiwung, Liwung, Gendiwung.

Malay.: Nibong. According to Ridley, the natives of the Malayan Peninsula distinguish several formes under the names of Lenau, Ibas or Ibu and Nibong Padi.

DESCRIPTION.—Stem 30-80 feet high, distinctly annulate, armed with long black spines, stoloniferous. Crown thick, graceful. Leaves pinnate, 10-12 feet long, drooping; petiole roundish, armed, very scurfy upwards; leaflets about 2 feet long, conduplicate at the base, acuminate, pendulous, coriaceous, many veined, principal keel above excentric, ferruginous scurfy, underneath bearing scales attached by their middle.

Spathes boat-shaped, two-keeled, of a stout texture, outer green, covered here and there with whitish-ferruginous scurf, armed on the back especially about the keels; inner almost unarmed, more scurfy, velvety. Spadices arising from the axils of fallen leaves; peduncle slightly armed; branches many, long, undulato-flexuous, lower ones divided, upper simple. A rudimentary bract at the base of the lower one. Flowers crowded, one female between two males, or in pairs, one male and one female, the former more advanced. Male flowers: sepals subeordate, cuspidate, keeled; petals 3, valvate, coriaceous, suddenly acuminate into subulate bristles, spreading; stamens 6, filaments short, stout, cohering slightly with the petals, anthers large, sagittate, obtuse; pistillode rather large, white, of 3 carpels which are distinct nearly from the base. Female flowers with a broad inconspicuous bract; sepals imbricate, suborbicular, concave, fleshy, coriaceous; petals larger, imbricate; staminodes 3 or none; ovary roundish, of the size of a small pea, 1-celled; style none. stigmas 3, connivent; ovule appense pendulous.

Fruiting spadix: branches 1-2 feet long, pendulous, purplish-sanguineous, with an articulated appearance; berry spherical, $\frac{4}{10}$ inch in diameter, surrounded at the base by the perianth, marked towards the apex on one side with an areola, bearing in the centre the remains of the stigmas; endocarp fibrous, thin; seed appense just below the areola; albumen horny, deeply ruminant; embryo oblong-conical, basilar.

HABITAT.—Singapore; common, Tanglin, Changi; Johor; Malacca; Pringgit and near the town; Cochin China; Borneo. Cultivated in India.

USES.—“The wood of the nibong is used for many purposes, in building for flooring, bridges and such like, also for pig spears. Sharpened spears of it are driven into the ground in lalang at such an angle that the point is about the level of the breast of the pig. The spears are pointed towards the garden to be protected from the wild pigs and quite concealed in the grass; when the pigs invade the garden the natives startle them by shouts and other noises, the pigs rush out and are impaled on the spears.” (Ridley.)

ILLUSTRATION.—Mr. Macmillan has kindly supplied us with the photograph reproduced on Plate LXXI. The left-hand groups consists of *O. fasciculatum* and the one to the right of *O. filamentosum*.

HYDRIASTELE, Wendl. and Drude in *Linnaea*, XXXIX, 180, 190, 208.

(Etym. : From the Greek "hydria" a water vessel or fountain, and "stela", a column, in allusion to the tall stems growing near springs).

Benth. Fl. Austral, VII, 138—F. Muell. Frag. Phytogr. Austral., VII, 101, 102.—Benth. and Hook., Gen. Pl. III, II, 885, 5.—Bailey Annusl. Fl., V, 1673.

Stem straight, high, slender, unarmed, annulate. Leaves terminal, pinnatisect, segments alternate, linear, præmorse-dentate at the apex; rhachis laterally compressed, convex on the back; petiole concave. Spadices shortly and broadly pedunculate, simply branched, branches elongate pendulous, obtusely quadrate; spathes 2, complete, deciduous; bracts and bracteoles forming an obscure cupule. Flowers monœcious, pale yellow or greenish, disposed in decussately opposite areolæ, three together, the central one female; bracts and bracteoles obsolete. Male flowers asymmetrical, compressed. Sepals minute, acute, scarcely imbricate. Petals ovate-lanceolate, acuminate, valvate. Stamens 6, filaments short, subulate; anthers linear, erect, basifixed. Female flowers much smaller than the male, subglobose. Sepals reniform, imbricate. Petals slightly longer, orbicular, convolute-imbricate. Staminodes obsolete. Ovary globose or ovoid; 1-locular; stigmas 3, minute, sessile patulate depressed; ovule inserted above the middle of the cell, pendulous.

Drupe small, elliptic, smooth or ribbed; stigmas terminal; pericarp fibrous; endocarp thinly crustaceous. Seed ellipsoidal, erect, free, hilum lateral; albumen equable; embryo basilar.

SPECIES—3.

DISTRIBUTION.—Tropical northern coast of Australia.

HYDRIASTELE WENDLANDIANA, Wendl. and Drude in *Linnaea*, XXXIX, 209; Bailey Queens Fl., V., 1673.—*Kentia Wendlandiana*, F. Muell. Fragm., VII, 102; Benth Fl. Austr., VII., 138.

NAME.—Wendlands Nymphen-Palme (German).

DESCRIPTION.—A tall palm. Leaves many feet long, segments numerous, unequal, the longest $1\frac{1}{2}$ foot long, the upper ones confluent at the base, all or most of them jagged or toothed at the apex.

Spadix of numerous slender pendulous spikes of about 1 foot, the common peduncle very short, broad and thick, marked with the scars of the spathe and of two outer bracts, the primary branches very thick, the rhachis of the spikes slender, the notches very little immersed. Female perianth (fruiting) about 2 lines in diameter; the segments all very broad, the inner twice as long as the outer ones.

Fruit ovoid or globular, when dry about 4 lines in diameter and longitudinally striate with prominent ribs, succulent when fresh with a thin endocarp. Seed erect, with an oblong oblique basal hilum, the testa free from the endocarp, the albumen not ruminant.

HABITAT.—N. Australia: Liverpool River, Queensland, Cape York, Cape Sidmouth.

CULTIVATION IN EUROPE.—A stove palm. It grows in a compost of loam and peat, in equal proportions; a little silver sand may be added. They need plenty of pot room, and a liberal supply of water throughout the summer, both at the roots and overhead. The imported seeds germinate quickly in a light sandy soil, if placed on a hotbed, young plants grown from seeds do well in the drawing room. The first leaves are deeply bifid and show already the præmorse-dentate tips.

ILLUSTRATION.—We have to thank Mr. Phipson for the photograph of *Hydriastele Wendlandiana*, reproduced on Plate LXXII. The specimen may still be seen in Victoria Gardens, Bombay.

RHOPALOSTYLIS, H. Wendl. and Drud in Linnæa, XXXIX, 180, t. 1, f. 2.

(Etym.: From "rhopalon", a club, and "stylos," a pillar; alluding to the club-shaped spadix.)

Mart. Hist. Nat. Palm, III, 172, t. 151, 152 (*Areca*) et 312 *Kentia sapida*).—Hook f. Fl. Nov. Zel. I, t. 59, 60, (*Areca*).—Drude Bot. Zeitg., 1877, 637, t. 6, f. 18-21". Bot. Mag., t. 5139, 5735 (*Areca*).—Benth. and Hook., Gen. Pl. III, II, 890, 16.

Unarmed low palms, stem annulate. Leaves terminal, equally pinnatisect; segments numerous, equidistant, narrowly ensiform, acuminate, margins at the base recurved, not thickened; rhachis on the concave side furfuraceous; petiole very short; sheath elongate.

Spadices short, patent, with a very short and stout peduncle; branches subflabellate, dense-flowered; spathes 2, complete, oblong, complanate, the lower one 2-winged; bracts subulate at the apex; bracteoles squamiform. Flowers monæcious on the same infraploiateous or iastigiate branched spadix, spirally disposed, ternate with the median one female, or the upper ones solitary and 2-nate male, with bracts and bracteoles. Male flowers asymmetrical, trigonous-compressed. Sepals subulate-lanceolate, scarcely imbricate. Petals obliquely ovate, acuminate, valvate. Stamens 6, filaments subulate filiform, inflexed at the apex; anthers linear, dorsifixed, versatile. Pistillode columnar. Female flowers smaller than the male, trigonous-globose. Sepals rotundate, concave, broadly imbricate. Petals smaller scarcely exserted, cochleate at the base, broadly imbricate, suddenly narrowed into triangular valvate tips. Staminodes obsolete. Ovary ovoid, 1-locular; stigma sessile, 3-fid, the trigonous segments erect; ovule parietal.

Fruit ellipsoidal, smooth, umbonate by the terminal stigma; pericarp fibrous; seed ovoid-oblong or ellipsoidal, erect, free, the broad hilum reaching from the base to the apex; albumen equable; embryo basilar.

SPECIES—2.

DISTRIBUTION.—New Zealand, Norfolk Island.

Flowers purplish lilac, drupe oblong...	...	<i>R. sapida</i> .
Flowers white, drupe globose	...	<i>R. baueri</i> .

RHOPALOSTYLIS SAPIDA, H. Wendl. and Drude in Kerch. Palm, 255; Cheesma New Zeal. Fl., 740.—*Kentia sapida*, Mart., Hist. Nat. Palm. III, 312; Drude, Palmæ in Nat. Pflanzenf., II., 3, 73.—*Areca sapida*, Soland, ex Forst. Plant, escul, 66; Ferd., Bauer Illustr. plant, Norfolk, t. 179, 180, 202, 203, in Museo Caes. Vindobon asservatæ; Mart., Hist. Nat. Palm, III, 172, t. 151, 152; A. Rich. Fl. Nouv. Zel., 157; *A. Cunn.*, Precur. n. 298; Raoul, Choix, 40; Hook., f. Fl. Nov. Zel., I, 262, t. 59, 60. Handb., N. Z. Fl., 288; Bot. Mag., t. 5139. *Areca banksii*, Allan Cunn. MS.

NAME.—Nikan Palm (English); Schmackhafte Nikan Palme (German).

DESCRIPTION.—Stem rather slender, smooth, 10-25 feet high, 6-9 inches in diameter, rarely more. Leaves 4-8 feet long; rhachis clothed with copious lepidote scales; leaflets very numerous, 2-3 feet long or more, 1-2 inches broad, linear-ensiform; midrib and main veins covered with lepidote scales; margins replicate at the base.

Spadix 1-2 feet long, much and closely branched, glabrous; spathes 2 or 3. Flowers very densely crowded, purplish-lilac. Drupe $\frac{1}{2}$ inch long, elliptic-oblong, bright-red.

HABITAT.—New Zealand. North Island, abundant in forests throughout; South Island, in low land districts not far from the coast as far south as Banks Peninsula and Hokitika, rare and local; Chatham Islands sea-level to 2,000 feet. (The Nikau-palm is the most southern member of its order).

FLOWERS.—From January to April.

USES.—The unexpanded central bud and the very young spadix are both edible, and were formerly eaten by the Maoris, and even by European settlers.

RHOPALOSTYLIS BAUERI, H. Wendl. and Drude in Bot. Zeitg., XXXV (1877) 638; Cheesem, New Zeal. Fl., 740.—*Kentia baueri*, Seem., Fl. Vit., 269; Cheesem., in Trans. N. Z. Inst., XX (1888), 174.—*Areca baueri*, Hook. f. in Illustr. Hist., XV. (1868), 575; Bot. Mag., t. 5735.—*Areca sapida*, Endl. Prodr. Fl. Norfolkicæ 26 (not of Soland)—*Seaforthia robusta*, Rollis (accord. to Salomon, Die Palmen).

NAME.—Norfolk Betel Palm (English); Bauers Nikau Palme (German).

DESCRIPTION.—Larger and stouter than the foregoing species, sometimes attaining a height of 50 feet and a diameter of over 12 inches. Leaves larger and more numerous, 6-9 feet long, pinnate; rhachis beneath, costa and nerves at back of the pinuls sparingly clothed with furfuraceous scales. Pinnales close-set, two feet long, $1\frac{1}{2}$ inch broad, stiff, acuminate, usually 3-nerved, ribbed and plaited; rhachis triangular towards the base, convex above.

Spathes 8-10 inches long, white, narrow-oblong, acuminate, flat at the back, 3-4 inches across. Spadix axillary, but, owing to the falling away of the leaf as soon as the spathe is ready to open and the flowers are fully formed, only flowering when infra-axillary, horizontally patent from the stem, 1-3 feet long, sparingly branched; branches stout, devaricating, white in flower, green in fruit. Flowers crowded, white, nearly $\frac{1}{2}$ inch when expanded. Outer perianth-segment broadly ovate in the female, narrower in the male, inner oblong, acute.

Drupe nearly globose, $\frac{1}{2}$ - $\frac{3}{4}$ inch in diameter, scarlet, shining.

HABITAT.—Kermadec Islands: Sunday Island, abundant from sea-level to the tops of the hills (1,500 feet). Originally discovered in Norfolk Island.

CULTIVATION IN EUROPE.—This and the foregoing species are ornamental stove-palms. They thrive well in a compost of loam and peat, in equal proportions, to which a little silver sand may be added. Plenty of pot room, and a liberal supply of water, both at the roots and overhead, are essential. The seeds germinate quickly in a light sandy soil, when placed on a hotbed. These palms are liable to be attacked by Red Spider or Thrips; in that case the plants must be sponged with soapy water.

Dammer says that *R. baueri* and *R. sapida* are hardy drawing-room palms which are best kept cool in winter. *R. baueri* sometimes stands several degrees of frost on the Riviera. In its original home *R. sapida* is, for some time of the year, exposed to frost and snow without taking harm. Salomon has observed that in winter this palm thrives much better at 42-46° F. than in a higher or lower temperature. Care should be taken, however, not to place the palm too far away from the light. In summer the plant will do well in the open garden.

To distinguish *R. baueri* from *R. sapida* the following points of difference should be noted:—

<i>R. baueri.</i>	<i>R. sapida.</i>
Greater height and longer leaves.	Leaflets more erect and comparatively narrower.
Leaflets of the regularly pinnate leaves more horizontal and, compared with their length, broader than those of <i>R. sapida</i> .	Leaves more reflexed at the top than in <i>R. baueri</i> .
Flowers white.	Flowers purplish-lilac.
Fruits scarlet and more spherical.	Fruits bright red, elliptic-oblong.

CYRTOSTACHYS, Bl. Rumph., II., 101, t. 120.

(From the Greek "cyrtos," curved, bent, and "stachys," a spike; in allusion to the curved spikes of flowers).

MART., Hist. Nat. Palm., 316.—Kunth Enum., Pl. III, 641. *Bentinckia*.—Walp. Ann., III, 647.—Mig. Fl. Ind. Bot. Suppl., 589 (*Areca erythropada*).—Scheff. Ann. Jard. Bot. Buitenz., 138, 159.—Benth. & Hook., Gen. Pl. III, II, 892, 20.

Stems slender, caespitose, annulate. Leaves pinnatisect; leaflets linear-lanceolate, acuminate, unicostate.

Spathes 2, complete, caducous. Spadix intrafoliar, shortly peduncled, broadly paniculately branched; branches 1-2 feet long, stout, spreading; flowers in spirally disposed clusters of 3, a female between 2 males.

Male flowers symmetrical; sepals orbicular, imbricate; petals valvate; stamens 12-15, exserted; anthers short, versatile; pistillode bifid. Female flowers: sepals orbicular; petals longer, broadly imbricate, tips valvate; staminodes forming a membranous cup; ovary narrowly ovoid; stigmas subulate ovule; pendulous from the tip of the cell.

Fruit small, ovoid; stigma terminal. Seed adherent to the endocarp, globose hilum apical; albumen equable; embryo basilar.

SPECIES.—About 3.

DISTRIBUTION.—Malayan.

CYRTOSTACHYS LAKKA, Becc., Ann. Jard. Buitenz. II, 141; Hook., Fl. Brit. Ind., VI, 414, *C. Lakka*, var. *singaporensis*, Becc. l. c. Ridley Mat. Fl. Malay. Penin. II, 149.

NAMES.—English: Sealing wax Palm.

German: Gruben Rendapalme.

Malayan: Pinang Rajah.

DESCRIPTION.—A slender tall soboliferous palm; stem 12-15 feet high, 3 inches in diameter, olive-green, smooth except for the node, internodes 6 inches long. Leaves 4-5 feet long, erect, pinnate; petiole 6 inches long, red; sheath 2 feet long, red; leaflets linear with long points, about 25 pairs, dark-green above, glaucous beneath, 18 inches long, $1\frac{1}{2}$ inch wide; rhachis red.

Spadix long, deflexed, green, finally red, with about 25 branches. Spathes broad oblong, curved. Flowers spirally arranged, 1 female between 2 males. Male flowers: Sepals ovate, green edged red; petals longer, ovate, green stamens 11 (12 or 15); filaments slender, bases adnate to the pistillode, longer than the petals, white; anthers small, oblong; pistillode thick; styles 3, base thickened and narrowed upwards, shorter than the stamens. Female flowers: Sepals broadly rounded; petals ovate, much larger, green; ovary globose; stigmas short, thick, recurved, brown.

Drupe small, obovoid, $\frac{2}{5}$ inch long by about $\frac{1}{5}$ inch in diameter, black, base scarlet; pulp thin. Seed ovoid, $\frac{1}{4}$ inch long; albumen equable; embryo basilar.

HABITAT.—Singapore: Kranji, Jurong; Pahang: near Pekan; Selangor: Klang; Perak: Teluk Anson (ex Ridley); Borneo. Cultivated in India.

NOTE.—*C. lakka* is very near the next species, *C. renda*, which has an ovoid fruit abruptly constricted and a globose seed.

CYRTOSTACHYS RENDAH, Bl. Rumph II, 101, t. 120; Kth. Enum. Pl. III, 641. Sheff. in Ann. Jard. Bot. Buit. I, 126, 159; H. Wendl. in Kerch. Palm, 242; List of Palms in Kew Rep., 1882 (1884), 55.—*Bentinckia renda*, Mart., Hist. Nat. Palm, III, 316; Miguel, Fl. Ind. Bat., III, 42 et Prodr. Fl. Sum., 254; Walp. Ann., III, 467, V., 812.—*Areca erythropoda*, Mig. in Journ. vot. neerl. 1, p. 6, et Prodr. Fl. Sum. 253, et 589.—*Ptychosderma coccinea*, Hort. Lugd. Bat., Cat. pl. hort. bot. Bog. (1866) 69; Mig. De Palm, 24.—*Pinanga purpurea*, Hort. Bog. in Mig. Prodr. Fl. Sum. 590.

NAMES.—Pinang rimbou, Pinang rendah or rende, Pinang Lem-pianw (Sumatra); Sealing-wax Palm (English); Rotstammige Renda-Palme (German).

DESCRIPTION.—A gregarious palm. Stem above 30 feet high, graceful, smooth, annulate. Leaves 6-6 feet long (excluding the leaf-sheath) decrescent-pinnatisect; petiole about 6 inches long. Segments narrow lanceolate, the longer ones 28 inches long, 2 inches broad, acuminate; the terminal segments shorter, bidentate or shortly bifid, or subobtusate.

Spathes: 2 complete, 2 incomplete. Flowers crowded, 1 female between 2 males. Stamens 12-15. Ovary unilocular, 1-ovuled, sometimes the rudiments of a second or third loculus are found; ovule pendulous from the tip of the cell; stigmas subulate.

Fruit ovoid, at the apex abruptly apiculate, $\frac{2}{5}$ inch long, $\frac{1}{4}$ inch broad. Seed round, about $\frac{1}{5}$ inch in diameter, adherent to the endocarp; hilum apical; albumen equable; embryo basilar.

HABITAT.—Sumatra.

CULTIVATION IN EUROPE.—This and the foregoing species are stove-palms. They grow in a compost of loam, peat, and leaf soil, in equal parts, with a liberal addition of sand. When they are fully grown, they prefer about two-thirds of loam and some rotten cow-manure. The seeds germinate in a compost similar to the one mentioned, when they are placed in a moist gentle heat.

ILLUSTRATION.—Plate LXXIII shows a fine tuft of Sealing-wax palms (*Cyrtostachys renda*) in the Botanic Gardens of Peradeniya. The photograph was taken by Mr. Macmillan.

PTYCHOSPERMA, Labill. in Mem. Inst. Paris, 1808, IX, 253.

(Etym.: From the Greek "ptyche," a fold or winding, and "sperma," seed; alluding to the ruminated albumen.)

R. Br. Prod. 267 (*Seaforthia*).—Mart. Hist. Nat. Palm, III, 182, t. 128, 129.—Benth. Fl. Austr., VII, 141 (*Ptychosperma*, sp. n. 4).—Seem. Fl. Vit., 272, t. 82.—Scheff. Ann. Jard. Buitenz. I, 120, 135, 154.—Wendl. and Drude in Linn. XXXIX, 183, 215.—Becc. Males, 1, 47, 99 (excl. sp.).—Benth. and Hook., Gen. Pl. III, II, 891, 18.

Stem erect, slender, high, unarmed. Leaves terminal, equally pinnatisect; segments linear or from the base towards the apex dilate, præmorse membranous, many-nerved, thickened on the margin, recurved at the base, the terminal ones confluent; rhachis trigonous, thin; sheath elongate.

Spadix paniculately branched; spathes 2, complete, caducous; bracts and bracteoles squamiform. Flowers monœcious, spirally arranged, ternate, the median one female, or the upper ones solitary and 2-nate male, all with bracts and bracteoles. Male flowers symmetrical, ovoid or oblong. Sepals orbicular, carinate on the back, gibbous or rotundate, broadly imbricate. Petals ovate or oblong, acute, valvate. Stamens 20-30, fasciculate, filaments short or elongate; anthers oblong or linear, attached on the back or towards the base, versatile. Pistillode styliiform. Female flowers often smaller than the male, subglobose. Sepals reniform or orbicular, broadly imbricate. Petals slightly longer, orbicular, convolute-imbricate, at the apex valvate or subvalvate. Staminodes 3 or more, minute. Ovary oblong or ovoid; stigmas 3, short sessile; ovule parietal pendulous.

Fruit ovoid or ellipsoidal, sometimes rostrate, terete or sulcate 1-locular; stigmas terminal; pericarp thick, fibrous; endocarp thin or crustaceous and smooth; seed erect, ovoid or oblong, terete or, deeply 5-sulcate; hilum reaching from the base to the top; branches of raphe obliquely descending; albumen more or less ruminant; embryo basilar.

SPECIES—About 17.

DISTRIBUTION.—Malay Archipelago, New Guinea, tropical, Australia, islands of the Pacific Ocean.

CULTIVATION IN EUROPE.—Elegant stove-palms. They grow best in fibrous loam, leaf mould and sand. Perfect drainage and a liberal supply of water are essential. Propagation is effected by seeds.

PTYCHOSPERMA ELEGANS, Bl. Rumph., II., 118; H. Wendl. in Bot. Zeit., 1858, 346; H. Wendl. et Drude in Linnæa, XXXIX., 215; Scheffer in Ann. Jard. Bot. Buit., I, 121, 122, 154. Benth. Fl. Austr., VII., 141. F. V. Muell. Fragm., VIII., 222, et Syst. Cens. Austr., Pl. 120; Becc. in Bull. Soc. tosc. ort., 1883, 108; H. Wendl. in Kerch. Palm, 254, Becc. Illustr. di alc. Palme nel Giard. Bot. di Buit. in Ann. Jard. Bot. Buit., II., 87. Bot. Mag., 7345.—*Ptychosperma seaforthia*, Mig. Fl. Ind. Bat., III, 21. (non Scheffer); B. Seem. in Journ. of Bot., I., 68. *Seaforthia, elegans*, R. Br.

We include also those species on which Beccari (Ann. Jard. Buitenz., II, 9091) founded the new genera *Balaka*, *Coleospadix* and *Normanbya*—See also Webbia, I. (1905) p. 299-302.

Prodr. Fl. Nov. Holl., 267 (1810). Hook. Bot. Mag., t. 4961 (tantum quoad fig. 9, 10, 11. Spreng. Syst. Veg., II., 623; Mart. Hist. Nat. Palm, III., 181, 313, t. 105, 106, 109; Kth., Enum. Pl. III. 189.—Wendl. Ann., III., 462, V. 809.

NAME.—Zierliche Faltennusspalme (German).

DESCRIPTION.—A rather slender palm. Leaves $6\frac{1}{2}$ feet long, recurved, regularly pinnatisect; rhachis semi-lunar, in cross section; leaflets 2 feet long, 1-3 inches broad, linear, tip very obliquely truncate and toothed, bright green, paler beneath; sheath 18-24 inches long, 6-7 inches broad.

Spadix 12-18 inches long, inserted below the leaves, very shortly peduncled, broadly triangular, repeatedly divided into strict branchlets; peduncle compressed; branchlets slender, terete. Flowers sessile, ternate, a female between 2 males, protandrous; towards the end of the branchlets glomerules of 2 male flowers only, and close to the apex single male flowers are developed. Male flowers regular, elongate, obtuse, $\frac{1}{2}$ inch in diameter; sepals orbicular; petals oblong, obtuse; stamens 25-30, exerted during the time of flowering; filaments erect; anthers versatile, deeply bifid at the base, bilobed-obtuse at the apex, broadly linear; pistillode well developed, ovate at the base, attenuate into the filiform style, about as long as the stamens. Female flowers globose-oval or ovate-conical, very small; sepals and petals largely imbricate; staminodes 3-6, dentiform minute, some being sometimes larger than the rest; ovary ovate, attenuate at the apex, not perfectly symmetrical, 1-celled; stigmas 3, triangular, acute; ovule parietale, marked with 5 distinct depressions which represent the furrows of the ripe seed.

Fruit seated on the aurescent calyx, $\frac{3}{4}$ inch long, oblong, crowned with the stigmas; pericarp fleshy; mesocarp finely fibrous; endocarp finely membranous, strongly adherent to the seed. Seed globose, with 3 deep longitudinal furrows, and 2 more superficial ones; albumen much ruminant; embryo basilar.

HABITAT.—Northern and Eastern Coasts of tropical Australia, and some of its outlying islands, from Sandy Island in lat. 25° S. to Cape York in lat. 11° N.

This palm was discovered by Sir Joseph Banks during Cook's first voyage in 1770, at the mouth of the Endeavour River.

USES.—In Queensland the stems are used for the rails of fences. The small stems used sometimes go under the name of "Moreton Bay Canes." The leaves are used by the aborigines for water baskets (Maiden).

LOXOCOCCUS, Wendl. and Drude Linn., 39 (1875), 185.

(From the Greek "loxos," oblique and "coccus" kernel, berry.) Bot. Mag., t. 6358. Benth. and Hook., Gen. Pl. III, II, 888, 13.

Trunk tall, erect, cylindric, annulate; leaves pinnatisect, leaflets linear, obliquely truncate, reduplicate-plicate.

Spathes 2, cymbiform. Spadix infrafoliar, monœcious, branched. Flowers ternate, mostly in clusters of a female between 2 males spirally arranged round the branches. Male flowers: sepals 3 orbicular, imbricate petals 3, much larger, ovate, valvate; stamens 9-12; filaments very short; anthers subversatile, pistillode minute, ovoid. Female flowers smaller than the male, subglobose; sepals orbicular, broadly imbricate, persistent; petals ovate, broadly imbricate, tips valvate, staminodes obsolete; ovary 1-celled, stigmas 3, minute, ovule parietal.

Fruit subglobose, cuspidately beaked; stigmas, terminal; endosperm ruminant; embryo subbasilar.

SPECIES—1. Endemic in Ceylon.

LOXOCOCCUS RUPICOLA, Wendl. and Drude in *Linnaea*, XXXIX, 185 (1875); Hook. f. in *Bot. Mag.*, t. 6358.—*Etychosperma rupicola*, Thw. *Enum.* 328, C. P. 2732.—*Caryota mitis* (?), Moon, *Cat.* 64.—*Kentia rupicola*, Bull. ex Salomon, p. 78.

NAMES.—Dotalu (Ceylon); Felsen-Krummnuss (German).

DESCRIPTION.—Trunk 30-40 feet high, 4-5 inches in diameter, dull green, base swollen, soboliferous. Leaves about 10, 6-8 feet long, 3-4 feet broad, spreading; petiole 1-1½ feet long with a short green sheathing base; leaflets 12-20 pairs, rather distant, spreading and decurved, sessile, linear, tip obliquely truncate and notched, bright green above, glaucous and sparsely furfuraceous beneath, terminal one or two pairs confluent.

Lower spathe 12 inches long, narrowly cymbiform, coriaceous, pale-brown, dotted with peltate furfuraceous scales. Spadix 12 inches long, triangular in outline, coral red, quite smooth; peduncle short, stout annulate; branches erecto-patent. Flowers blood-red, male flowers about ½ inch in diameter; filaments stout, equalling the linear anthers, pistillode minute, trifid. Female flowers ovoid; ovary obliquely ovoid; ovule pendulous.

Fruit about ¾ inch in diameter, smooth, blood red; sarcocarp fibrous.

HABITAT.—On cliffs and rocks in the moist region of Ceylon, from 1,000-5,000 feet; rather common. (Endemic in Ceylon.)

FLOWERS in February.

USES.—The seed is used for mastication with betel, like that of the Arecas.

CULTIVATION IN EUROPE.—An elegant stove-palm. It thrives in a compost of loam, peat, and leaf soil, in equal parts, with a liberal addition of sand. When it is fully grown, loam should constitute about two-thirds of the compost; some rotten cow-manure may be added. Propagated by seeds. These require a compost similar to the one mentioned and must be put in a moist gentle heat.

This is a most attractive palm from its graceful habit and its coral-like inflorescence. Seeds of this plant were sent to Kew by Dr. Thwaites, Director of the Botanical Gardens of Peradeniya and it flowered for the first time in the Victoria House at Kew in February 1878.

ILLUSTRATION.—We reproduce on Plate LXXIV the photograph of a young specimen of *Loxococcus rupicola* from the Botanic Garden of Peradeniya. The photograph was taken by Mr. Macmillan.

(To be continued.)

A LIST OF BUTTERFLIES CAUGHT BY CAPT. F. M. BAILEY IN S. E. TIBET DURING 1913,

BY

CAPT. W. H. EVANS, R. E.

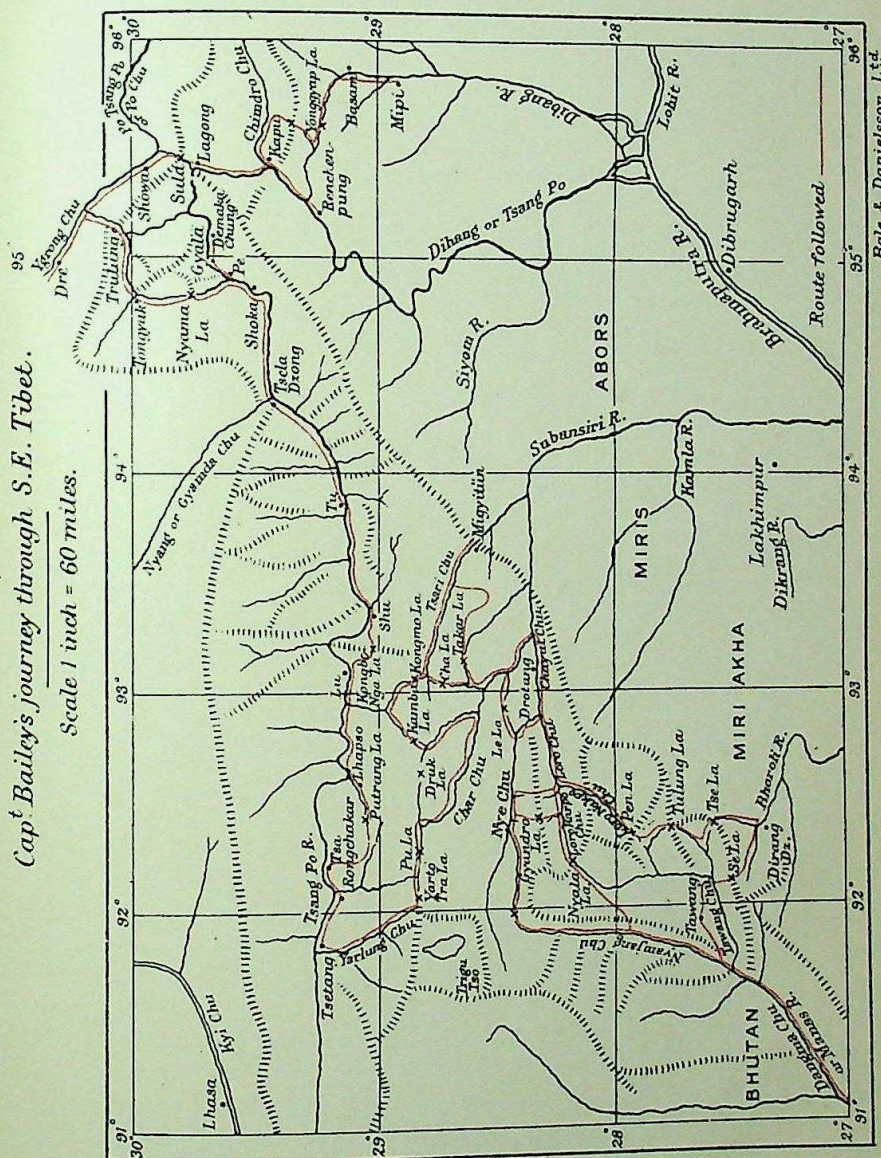
(With a Plate and a Map.)

In 1913 Capts. Bailey and Morshead succeeded in traversing a previously unexplored tract of country in S. E. Tibet. A full account of their journey will be found in the proceedings of the Royal Geographical Society; the following brief narrative and the map will, however, help in explaining the localities mentioned in the list of butterflies.

Leaving the Mishmi country and the valley of the Dibang river in the middle of May, they travelled through the country east of the Tsang Po (Dihang) arriving at Kapu on that river on June 5th. Thence they travelled down the river as far as Runchenpung and then up again to Lagong (June 19th), where the Tsang Po pierces the main range, which separates India from Tibet. Above Lagong the route along the river is impassable except during the winter month and accordingly the travellers struck north over the Su La (June 23rd) into the valley of the Po Chu. They spent several weeks exploring the Po Chu and its tributaries, the Ygrong Chu and the Rong Chu, eventually crossing the Nyama La (July 13th) and reaching the Tsang Po again at Pe (July 13th). From Pe they went down the Tsang Po as far as Pemako Chung (July 21st) and then back again to Pe (Aug. 4th). The course of the Tsang Po was followed up as far as Shu (Aug. 18th) where a slight detour to the south over the Kongbo Nga La (Aug. 18) was found necessary; a second detour over the Putrang La (Aug. 28th) was made later. At Tsetang (Aug. 29th) the Tsang Po was left for good and the explorers struck south up the Yarlung Chu and over the Yartotra La (Sept. 2nd) and then over the Pu La into the valley of the Subansiri (Sept. 4th). They went down the Char Chu for four days and then up the Karpo Chu over the Kumba La into the basin of the Tsang Po: thence over the Kongmo La (Sept. 12th) into the Tsari Chu valley, another branch of the Subansiri. The Tsari Chu was followed down as far as Migyitun (Sept. 18th), whence they re-entered the Char Chu Valley *via* the Tanga La (Sept. 21st): this valley was left at Charme (Sept. 22nd) and the Nye Chu [Sept. 26th), entered *via* the Le La. They went down the Nye and Chayul valleys as far as Drotang and then up the Chayul Chu, called the Loro in its upper reaches, into the Loro Napko Chu. On October 2nd they left the basin of the Subansiri by the Pen La and proceeded *via* the Tulung La

Sketch map of
Cap^t Bailey's journey through S.E. Tibet.

Scale 1 inch = 60 miles.





and the Tse La down to Dhirang (Oct. 12th) on a tributary of the Bhoroli river. This tributary was followed to its source and, crossing the Se La, they reached Tawang on October 16th. After exploring the Nyamjang Valley and the upper waters of the Nye and Loro rivers they travelled through Eastern Bhutan and reached Dewangiri in Assam on November 13th. It may be noted that "Chu" means river and "La" pass in Tibetan.

Captain Bailey had previously taken a considerable interest in butterflies as may be seen from Mr. South's paper on the butterflies caught by him in 1911 in S. E. Tibet and the Mishmi Hills (J. B. N. H. S. XXII. 345 and 598). The country traversed in 1911 lies to the east of that dealt with in this paper and his two journeys have succeeded in practically linking up the fairly well-known district, Chumbi Valley, Gyangtse, with Western China (Szechuan). About 2,000 butterflies were obtained in 1913 belonging to nearly 200 species.

From a natural history point of view, the country traversed may be divided into five well-marked districts:—

A.—The Lower Tsang Po Valley, known as Pemako, below the gorge where the river breaks through the main range, also the country to the east towards the Mishmi Hills, May 15th to June 23rd. A densely wooded district with a heavy rainfall, elevation 3,000 to 7,000 feet. Here the greatest number of species were obtained, as might perhaps have been expected. The fauna resembled that of Upper Assam, showing a transition more or less to that of Western China. Of the 102 species captured the following may be noted as of especial interest:—

Erebia narasingha, M.

Eulepis narcaea, Hewt.

Lethe armandii, Oberth.

Ypthima methorina medusa, Leech.

Calinaga davidis, Oberth.

Gonepteryx amintha, Blanch.

B.—The Po Chu Valley, district Pome, June 23rd to July 13th, well wooded with a moderate rainfall; elevation 7,000, passes up to 14,300 feet. This proved an interesting country, as, though the Po Chu is a tributary of the Tsang Po, the two valleys are separated by snowy ranges. As compared with the Lower Tsang Po district, a marked change is noticeable in the fauna and all the 64 species obtained were palæarctic; of these the following were of interest:—

Pararge thibetana albicans, South.

Argynnis paphia and *gong*.

Four *Aporias*.

A large form of *Lycaena pheretes*.

Two *Pamphilas*.

Three *Erebias*.

Melitaea sindura jezabel.

Cyaniris oreas.

Celenorrhinus thibetana.

Augiades bouddha, Mab.

C.—The Upper Tsang Po Valley, July 13th to end of August; elevation 8,500 to 11,000 feet, passes considerably higher. The lower portion of this district, between Pe and Pemako Chung was similar in character to the Po Chu Valley; higher up the country was more like the dry barren mountainous region to the south, which was traversed later. 43 species were obtained, many of which had already been captured in the Po Chu Valley, while others were obtained in the next district.

The following species were not encountered elsewhere:—

A variety of one of the Po Chu *Erebas*.

Aphantopus hyperanthus.

Argynnis rudra and *jainadeva*.

Gonepteryx alvinda.

Zephyrus bieti, *icana* and *suroia*, Tytler.

Apatura iris bieti.

Hypporion lama.

Everes ion.

D.—The mountainous country lying around the upper waters of the Subansiri between the Tsang Po and main range, which separates India from Tibet, September; elevation 11,000 to 16,000 feet. A dry barren country, which produced only 24 species, closely resembling in character the butterflies obtained in the Chumbi Valley and round Gyantse; those of interest were:—

Vanessa urtica chinensis.

Argynnis eugenia rhea and *gemma genia*.

Colias cocandica.

A new species of *Lycena*.

Melitaea didyma agar.

A new species of *Cyaniris*.

Zephyrus duma.

E.—The densely wooded country about eastern border of Bhutan within the watershed of the Bhoroli river, October; elevation 5,000 to 8,000 feet. Most of the 80 species obtained belong to forms found commonly in Sikkim, the only butterfly of any interest being *Erebia annada polyphemus*. After October but little collecting was done.

1. *Danaïs melanea*, Cr. A single male at Dewangiri, 1,500 feet, Nov. 13th.

2. *Danaïs tytia*, Gray. 2 ♂ and 3 ♀ in the Lower Tsang Po district, the Po Chu Valley, at Dhiran and Dewangiri.

3. *Euploea mulciber*, Cr. 2 ♂ at Dhiring, 5,000 feet, October.

4. *Pararge masoni*, Elwes. 1 ♀, Migyitun, 10,000 feet, Sept. 15th.

5. *Pararge thibetana albicans*, South. 32 specimens mostly in the Po Chu Valley at 7,500 to 10,500 feet in June and a few along the Tsang Po in July between Gyala and Kongbo Nga La, 9,000 to 12,500 feet.

They agree with Mr. South's description of the single specimen obtained by Capt. Bailey on his former trip (J., B.N.H.S., xxii., 346).

6. *Rhaphicera satricus*, Doubl. 1 ♂, Po Chu valley, July 7th, 8,000 feet.

7. *Satyrus pumilus bicolor*, Stdg. 20 specimens at the end of August and in the beginning of September, 13,000 to 16,000 feet, on the Tsang Po between Kongbo Nga La and Tsetang, on the Yartotra La and in the Char Chu and Karpo valleys.

8. *Satyrus loha*, Doherty. 13 specimens mostly males at 6,000 to 8,000 feet in October and November between Tawang and Kyeri near the Bhutan border.

9. *Satyrus loha chumbica*, M. 9 males between Pemako Chung and Kongbo Nga La on the Tsang Po in August, 7,500 to 12,500 feet. 8 females in September in the Karpo Valley and at Migyitun at 10,000 to 12,500 feet. In many of the males the band was quite yellow, especially on the underside.

10. *Satyrus saraswati*, Koll. 11 worn specimens in the neighbourhood of Dhirang about the middle of October at 6,000 feet.

11. *Erebia pomena*, n. sp. (see plate). 56 specimens, including one pair in copula, mostly in the Po Chu Valley, a few at Lagong and Pemako Chung on either side of the gorge where the Tsang Po breaks through the main range; June and July, 4,500 to 9,600 feet.

Above dark velvet brown, as in *shallada*, Lang; a small apical ocellus on the forewing, single pupilled and narrowly ringed with obscure fulvous; a similar subanal ocellus on the hindwing, the fulvous ring of which is elongated outwardly and beyond there is an obscure fulvous area continued along the margin to vein 3. Below the forewing is bright fulvous except for a narrow brown area sprinkled with white scales beyond the apical ocellus; this area is continued narrowly along the outer margin and bears inwardly a dark line in addition to the terminal dark line; the inner margin somewhat broadly, the costa and base narrowly dusky; the apical ocellus as above but the fulvous ring lighter and more clearly defined. The hindwing dark brown overlaid with whitish scales; an anal ocellus in space 1 similar to the apical ocellus on the forewing and above a series of postdiscal prominent white spots in spaces 2 to 5; an ill-defined irregular brown discal and a similar, but more obscure, subbasal line; dark subterminal and terminal lines as on the forewing. Female as male; above the apical ocellus is better defined and surrounded inwardly to the end of the cell and below to vein 3 by a fulvous area, prominent in some specimens and obscure in others; below the tone is brighter and all the markings are more clearly defined. The outer margin in both sexes is straight. In the male there is an obscure patch or modified scales on the central third of the forewing extending from the dorsum to the costa. Expanse 2½ inches. Types in copula, Tongto, 7,500 feet, June 30th.

The new species most nearly resembles *shallada*, Lang, and is sufficiently characterised by the straightness of the outer margin and the presence of the subanal ocellus on the hindwing.

12. *Erebia pomena shuana*, sub-sp. n. (see plate). 32 specimens along the Tsang Po between Timbe and Kongbo Nga La, 10,000 to 12,500 feet, August 5th to 18th; mostly at Shu.

Closely allied to *pomena*. The apical ocellus on the forewing is three times as large and the white pupil is very prominent; in the female there is

occasionally a second minute pupil. The fulvous anal area on the hindwing is more extensive and much lighter, usually confluent with the ring of the ocellus. Below paler and all the markings wider. Expanse $2\frac{1}{2}$ inches.

13. *Erebia phyllis qyala*, sub-sp. n. (see plate). 28 specimens including one pair in copula, late June to early August, 8,000 to 11,000 feet; a few in the Po Chu Valley and the bulk at Pe on the Tsang Po. Also a single aberrant specimen a good deal higher up the river at Tsa near Rongchakar, 12,000 feet, August 28th.

Differs from *phyllis*, Leech in the following particulars. The ocellus on the forewing above is bordered with bright fulvous; on the hindwing there is a subanal ocellus set on a fulvous area, which is extended upwards along the margin; rarely this ocellus is absent and the fulvous area is restricted. On the hindwing below there is an irregular sub-basal and discal narrow brown line, often prominent and occasionally obsolete; the discal band is often bordered outwardly with dull yellow patches. There is nearly always a subanal ocellus and the white spots above may be prominent or obsolete.

This race is very near *inconstans*, South (J., B. N. H. S., xxii., 350) and only differs in the presence of the subanal ocellus on the hindwing; specimens without the ocellus cannot be separated from *inconstans*.

In the single female from Tsa the apical ocellus is inwardly bordered by the fulvous area, but this area does not extend below the ocellus; below the bands on the hindwing are very prominent and in addition there is a sub-terminal band; the white spots are clearly defined but very minute, and the anal ocellus is absent.

14. *Erebia tsirava*, sp. n. (see plate). 10 males in the Po Chu Valley and one at Pemako Chung on the Tsang Po, 7,500 to 9,000 feet, June 30th to August 7th.

Closely allied to, if not a race of, *annada*, M; smaller, about the size of *oria*, M. Above it is very similar to typical *annada*, but the fulvous area below the ocellus is rather more developed, while the ocellus itself is smaller and more rounded. Below the looped band is absent from round the ocellus on the forewing; the hindwing bears a single small subanal ocellus, while the dorsal and outer margins are broadly covered with closely set white scales, leaving only a broad rectangular, dark-brown costal area.

15. *Erebia annada polyphemus*, Oberth. A worn male at Tawang, 8,000 feet in October.

16. *Erebia narasingha*, M. 7 ♂, Lower Tsang Po. 3,000 to 6,000 feet, June 4th to 19th.

17. *Aphantopus hyperanthus luti*, sub-sp. n. (see plate). 54 specimens at 9,000 to 10,000 feet on the Tsang Po between Pemako Chung and Tu, July 17th to August 13th.

Above dark-brown with white cilia, bearing 3 ocelli on the forewing and 2 on the hindwing with narrow but well defined dull yellow irides, as in the form *ocellatus*. In specimens from the Amur and Corea, the ocelli are prominent in the female but tend to obsolescence in the male. Below rather pale, brown obscurely dusted over with white, especially on the hindwing where the veins are finely white; the ocelli as on the upperside but with broader brighter yellow irides; on the hindwing there is an additional ocellus in space 5, with often a small one adjoining it above, also a small ocellus in space 1. The ocelli above are usually pupilled and below always so. Very near *ocellatus*, differing conspicuously in the paleness of the colouring on the underside.

18. *Zipetis scylax*, Hewit. Two males on the Lower Tsang Po, at 3,000 feet early in June.

19. *Ypthima newara*, M. 42 specimens on the Lower Tsang Po and in the Po Chu Valley, also one at Pemako Chung, at 3,000 to 9,000 feet in June and July; a single specimen at Dhirang, 5,000 feet in October.

They agree best with the eastern race *sarcaposa*, Fruh, of which I have specimens from Manipur. They may, however, be referable to *chinensis*, Leech, which does not seem to be specifically distinct from *newara*.

20. *Ypthima baldus*, Fabr. 1 ♂, Dewangiri, 1,000 feet, November.

21. *Ypthima affectata*, Elwes and Edw. 2 ♀, Lower Tsang Po, 3,000 feet, June.

22. *Ypthima methorina medusa*, Leech. 4 specimens on the Lower Tsang Po, 3,000 to 8,000 feet in early June. Agrees as to races with the Indian *persimilis*, El and Ed, but is smaller and with the wings rounded.

23. *Ypthima sakra*, M. 69 specimens, 4,500 to 9,000 feet, mostly on the Lower Tsang Po, the Po Chu Valley and one at Pemako Chung, May to July, a few at Dhirang in October. They agree best on the whole with the Sikkim form, true *sakra*, but many are inseparable from the eastern race *austeni*, M. In most of the specimens the subterminal dark areas on the underside are obsolete.

24. *Lethe dyrta*, Fd. 1 ♂, Dhirang, 5,000 feet, October.

25. *Lethe confusa*, Aurivill. 1 ♂, Dewangiri, 1,000 feet, November.

26. *Lethe verma*, Koll. 3 ♂, Lower Tsang Po, 6,000 feet, June and Dhirang, 5,000 feet, October.

27. *Lethe sidonis*, Hewit. 18 specimens, 5,500 to 10,000 feet; mostly in the Po Chu Valley, June and July; near Tawang, October; single specimens at Migyitun, September and on the Lower Tsang Po in June.

28. *Lethe visrava*, M. 1 ♂, 4,500 feet, Lower Tsang Po, June.

29. *Lethe nicetas*, Hewit. 2 ♀, near Dhirang, 6,000 feet, October.

30. *Lethe insana dinarbas*, Hewit. 2 ♂, Lower Tsang Po, 5-6,000 feet, May and June.

31. *Lethe brisanda*, Den. 3 ♂, Lower Tsang Po, 5-6,000 feet, June.

32. *Lethe serbonis*, Hewit. 1 ♂ near Fe, 9,400 feet, on the Tsang Po on August 2nd and a ♀ near Dhirang, 7,000 feet, Oct. 10th.

33. *Lethe chandica*, M. 1 dry season ♂.

34. *Lethe distans*, Butl. 1 dry season ♂.

35. *Lethe scanda*,

36. *Lethe bhairava*, M. 6 ♂.

37. *Lethe gulnihal*, de N. 1 ♂.

38. *Lethe sinorix*, Hewit. 1 ♂.

39. *Lethe sura*, Doubl. 1 ♂.

40. *Lethe pulaha*, M. 1 ♂.

41. *Lethe armandii*, Oberth. 2 ♂, dry season form.

42. *Lethe yama yamoides*, M. 1 ♂.

Nos. 33-42 all obtained on the Lower Tsang Po, 3-7,000 feet, in June.

43. *Neorina hilda*, Westw. 1 ♂ near Dhirang, 7,000 feet, October.

44. *Mycalesis mestra*, Westw. 1 ♂, Lower Tsang Po, 6,000 feet, June.

45. *Mycalesis suavelens*, de N. 4♂, Lower Tsang Po and Po Chu Valley 5—8,000 feet, June and early July.

46. *Mycalesis nisenus*, de N. 1♂; Lower Tsang Po, 3,000 feet, June.

47. *Melanitis phedima bela*, M. 1♂ dry season form.

48. *Anadebis himachala*, M. 5 specimens.

49. *Clerome eumeus assama*, Westw. 2♂.

50. *Thaumantis diores*, Westw. 1♂.

51. *Discophora tullia zal*, Westw. 1♂.

52. *Enispe euthymius*, Doubl. 1♂.

53. *Enispe cyenus*, Westw. 1♀.

54. *Eulepis dolon centralis*, Roth. Sch. 4♂.

55. *Eulepis eudamippus*, Doubl. 1♂.

Nos. 48—55 all obtained on the Lower Tsang Po, 3,000—7,000 feet in June.

56. *Eulepis narcae*, Hewit. 25♂ Lower Tsang Po, 2,600—5,000 feet early in June.

57. *Apatura iris bieti*, Oberth. One pair on the Lower Tsang Po, below Pe at 9,000 feet at the end of July and early in August.

58. *Apatura parisatis*, Westw. 5♂ on the Lower Tsang Po, 3,000 feet in June.

59. *Euthalia franciae*, Gray. 1♂, same locality as last.

60. *Euthalia phemius*, Doubl. 1♂, Dewangiri, 1,000 feet, November.

61. *Euthalia telchinia*, Mènèt. 1♀, Lower Tsang Po, 3,000 feet, June.

I identify the specimen as *telchinia* with some doubt. It is dark-brown above, the outer areas beyond the cells being abruptly paler, but darkening slightly again towards the apex of the forewing and the outer margin of the hindwing. On the forewing the outer edge of the dark area is bent inwards at vein 2 and runs obliquely to the anal angle; there are two obscure pale bands in the cell and a discal row of similar spots near the bases of spaces 2—4. Beneath, the ground colour is pale olive-brown, the basal half of the hindwing being dusted with bluish white; there are the usual markings in the cells and a discal and subterminal band on both wings, the discal band on the forewing being much broken; the white spot in 2 is very large and prominent, those above it small and inconspicuous; the apex of the forewing is tipped with white.

62. *Liminitis austenia*, M. 3♂ on the Lower Tsang Po, 2,600 to 4,000 feet in June. The specimens were typical.

63. *Liminitis danava*, M. 1♂.

64. *Liminitis darava*, Doubl. 3♂.

65. *Liminitis dudu*, Westw. 1♂.

66. *Pantoporia asura*, M. 1♂.

Nos. 63—68 on the Lower Tsang Po, 3,000 feet, June.

67. *Pantoporia jina*, M. 2♂, Lower Tsang Po, 5,500 feet, June and 1♂, Dhirang, 6,500 feet, October.

68. *Pantoporia opalina*, Koll. 4♂, Lower Tsang Po, 3,000 feet, June, Po Chu Valley, 7,500 feet, July and Dhirang, 6,500 feet, October.

69. *Neptis hylas emodes*, M. 24 specimens at 3-4,000 feet, on the Lower Tsang Po in June, also near Dhirang, 6,500 feet, October.

70. *Neptis yerburyi*, Butl. 4 specimens, Lower Tsang Po, 6,500 feet June, Po Chu Valley, 8,000 feet, June, and Dhirang, 6,500 feet, October.

71. *Neptis sankara*, Koll. 1 ♂, Po Chu Valley, 8,000 feet, July.

72. *Neptis zaida*, Doubl. 1 ♂ Lower Tsang Po, 3,000 feet, June. Differs from typical specimens in that on the upperside there is no trace of the discal streak extending into space 2 and that the underside is a good deal darker.

73. *Neptis vikasi harita*, M. 3 ♂ and 1 ♀, Lower Tsang Po, 3,000 feet, June, of the wet season form *pseudovikasi*, M.

74. *Cyrestis thyodamas*, Boisd. 3 ♂, Lower Tsang Po and Po Chu Valley, 3-7,000 feet, June and July.

75. *Junonia orithyia*, L. 16 specimens, Lower Tsang Po, June, and near Dhirang, October, 5-8,000 feet.

76. *Junonia hierta*, Fab. 1 ♂, Dhirang, 6,500 feet, October.

77. *Junonia atlites*, Johan. 1 ♂, Nyamjang Valley, 8,000 feet, October.

78. *Vanessa cardui*, L. 3 ♂, Po Chu Valley, 9,000 feet, June; Pe, 10,000 feet, July; Nyamjang Valley, 8,000 feet, October.

79. *Vanessa indica*, Herbst. 5 specimens, Lower Tsang Po, 5,500 feet, June; Dhirang and Nyamjang Valley, 5,500-7,000 feet, October.

80. *Vanessa canace*, Johan. 1 ♂, Lower Tsang Po, 7,000 feet, June.

81. *Vanessa cashmirensis*, Koll. 11 specimens, Dhirang, Tawang and the Nyamjang valley, 6-10,000 feet, October.

82. *Vanessa urtica chinensis*, Leech. 12 specimens; a few worn specimens in the Po Chu Valley, 8-10,000 feet, July; a few at the Pe on the Tsang Po, 10,000 feet, July; the remainder in the high country, south of the Tsang Po, 12-15,000 feet, September.

83. *Vanessa ladakensis*, M. 28 specimens in the high country south of the Tsang Po, 14-16,000 feet, September.

84. *Vanessa c-album tibetana*, Elwes. 2 ♂, Po Chu Valley, 7,000 feet, July, and Karpo Valley, south of the Tsang Po, 12,500 feet, September.

85. *Araschnia prorsoides dohertyi*, M. 2 ♂, Po Chu Valley, 7,000 feet, July, and at Rongchakar on the Tsang Po, 9,000 feet, July.

86. *Symbrenthia hypselis cotanda*, M. 2 specimens, Lower Tsang Po 3-6,000 feet, June.

87. *Argynnis hyperbius*, Johan. 9 specimens, Lower Tsang Po, 3-5,000 feet, May and June; Dhirang, 5,000 feet, October.

88. *Argynnis chidreni*, Gray. 6 specimens, Lower Tsang Po, 4-7,000 feet, June; Po Chu Valley, 7,000 feet, July; Dhirang, 7,000 feet, July.

89. *Argynnis paphia megalegoria*, Fruh. One pair Po Chu Valley, 7,000 feet, July. Very like the typical *paphia*, L., but larger and more brilliantly coloured.

90. *Argynnis laodice rudra*, M. 4 ♂, on the Tsang Po between Pe and Tu, 9-10,000 feet, July and August. The specimens are intermediate between *samana*, Fruh, from W. China and *rudra* from Assam; smaller and paler than *rudra*, though not so much so as *samana*; below no green at the apex of the forewing, therein resembling *samana*; the sub-basal brown band on the hindwing broad as in *rudra*.

91. *Argynnis adippe jainadeva*, M. 46 specimens on the Tsang Po between Gyala and Tu, 9-10,000 feet, July and August. Rather paler than typical *jainadeva*, but not so pale as the Ladak race *pallida*, Mihi.

92. *Argynnis lathonia issca*, Doubl. 24 specimens, Lower Tsang Po and Po Chu Valley, 7-10,000 feet, June and July; Tawang, 10,000 feet, October.

93. *Argynnis clara manis*, Fruh. 8 specimens in the high country south of the Tsang Po, 10-15,000 feet, September.

94. *Argynnis gong*, Ober. One worn female, Po Chu Valley, 10,000 feet, July.

95. *Argynnis gemmata genia*, Fruh. (see plate). 24 specimens at 12-16,000 feet in the high country south of the Tsang Po in September; in several the silver colouring on the underside is replaced by yellow, and this variety may be called *fulva*, nov.

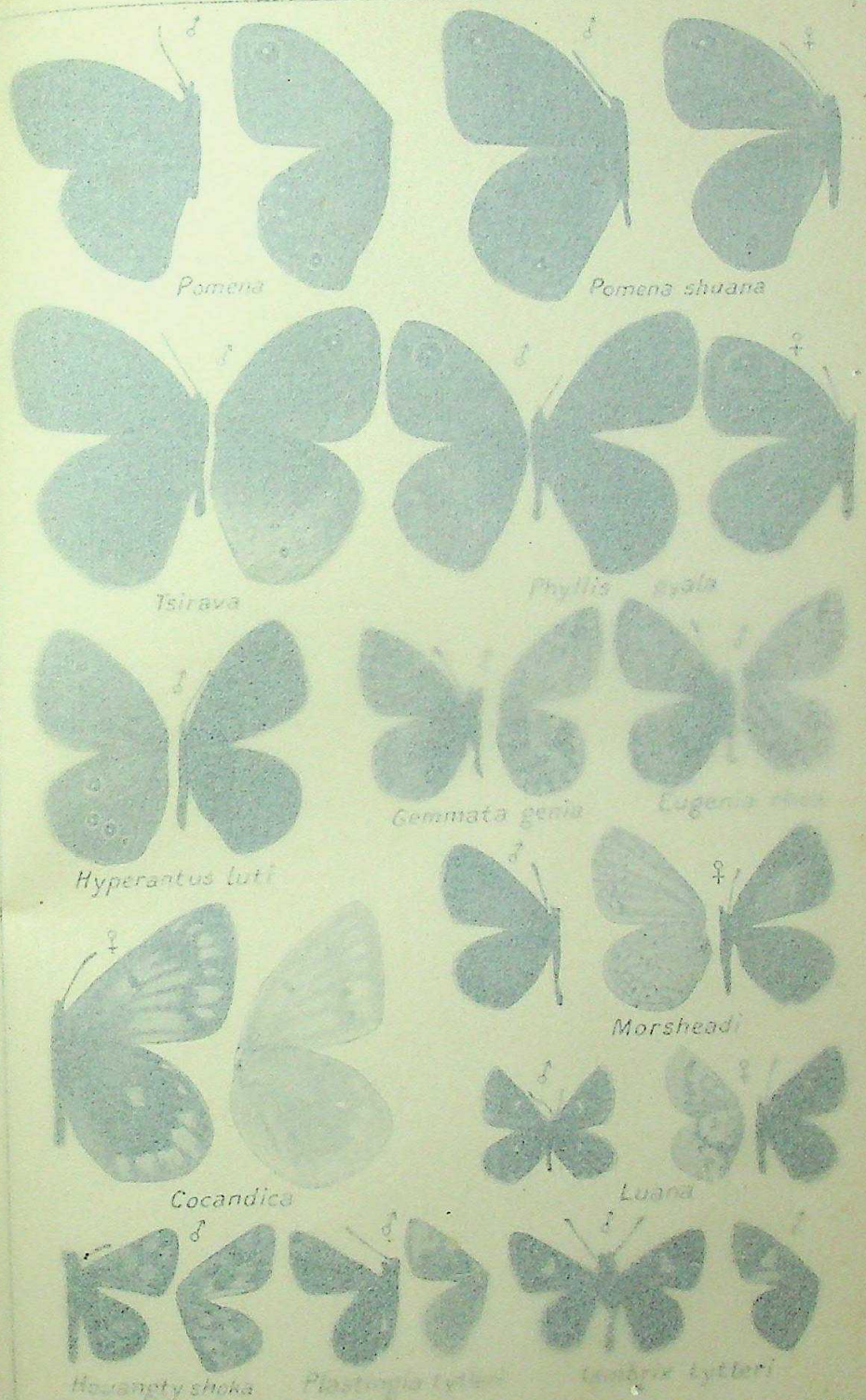
96. *Argynnis eugenia rhea*, Groum. (see plate). 42 specimens caught at 12-16,000 feet at Lu on the Tsang Po and in the high country to the south in August and September.

These two species are very similar in general appearance. In *genia* vein 10 is emitted at the end of the cell, thus it falls in true *Argynnis*, while *rhea* appertains to Moore's genus *Boloria*, as this vein is emitted well beyond the cell. I would, however, remark that this feature is of little value from a generic point of view, as in *clara*, Blanch, the vein is emitted well after the end of the cell and in the race *manis*, Fruh, just after that point. In the *gemmata* group, which includes *eugenia* and *altissima*, the pattern of the hindwing below does not vary appreciably; in *gemmata*. But, and its dwarf race *genia* the silver spot at the centre of the costa is more or less upright and square in shape, also the cinnamon red areas are broad and prominent: in *altissima* and *eugenia* the spot mentioned is sloping and the red areas are indistinct. *Genia*, if my identification is correct, is remarkable in that the marginal black band, prominent in the other allied species, is absent and the cilia are concolourous with the ground colour. *Altissima* appears to be a good species; vein 10 arises just after the end of the cell; the forewing is sharply pointed and the outer margin straight below that point; all the silver markings on the underside are narrow and elongated, while the black spot near the base of cell 2 on the forewing above is placed nearer the outer margin than in the other species of the group. *Eugenia*, Everman, is a species flying from South Siberia, through West China and Tibet to the Himalayas; vein 10 arises well beyond the end of the cell, its origin being equi-distant between that point and the origin of vein 9; in the nymotypical Northern form the large silver spot crossing the end of the cell on the hindwing below is quite short; in the Tibetan race *rhea*, described from Amdo, it is elongate as in *gemmata*. Mackinnon, de N., from the Himalayas, is, I am convinced, a race of *eugenia* and has nothing to do with *altissima*; it hardly differs from *rhea*, but the cinnamon red areas below are rather more prominent and the cilia above are concolourous with the ground colour instead of being whitish.

97. *Melitæa sindura jezebel*, Oberth. 102 specimens in the Po Chu Valley and on the Tsang Po between Gyala and Du and just beyond the Kongbo Nga La at 10-13,000 feet in July and August. The specimens appear to be nearest to *jezebel* from Eastern Tibet. Above dark, the outer band strongly developed; below very brick red, the forewing often without any discal markings. Specimens I have from Gyantse are very similar differing only in the lesser development of the outer discal band on the forewing above. Both are very different from the small dull Chumbi Valley form *sikkimensis*, M. and are nearer to *balbita*, M. from Kashmir, though smaller.

98. *Melitæa didyma agar*, Oberth. 57 specimens mostly on the Tsang Po between Gyala and Lhaptu at 9-13,000 feet in July and August and a few

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92. *Argynnis lathonia* Esca, Doubl. 24 specimens, Lower Tsang Po and Po Chu Valley, 7-10,000 feet, June and July; Tawang, 10,000 feet, October.

93. *Argynnis clara* maai, Fruh. 8 specimens in the high country south of the Tsang Po, 10-15,000 feet, September.

94. *Argynnis gump*, Ober. One worn female, Po Chu Valley, 10,000 feet July.

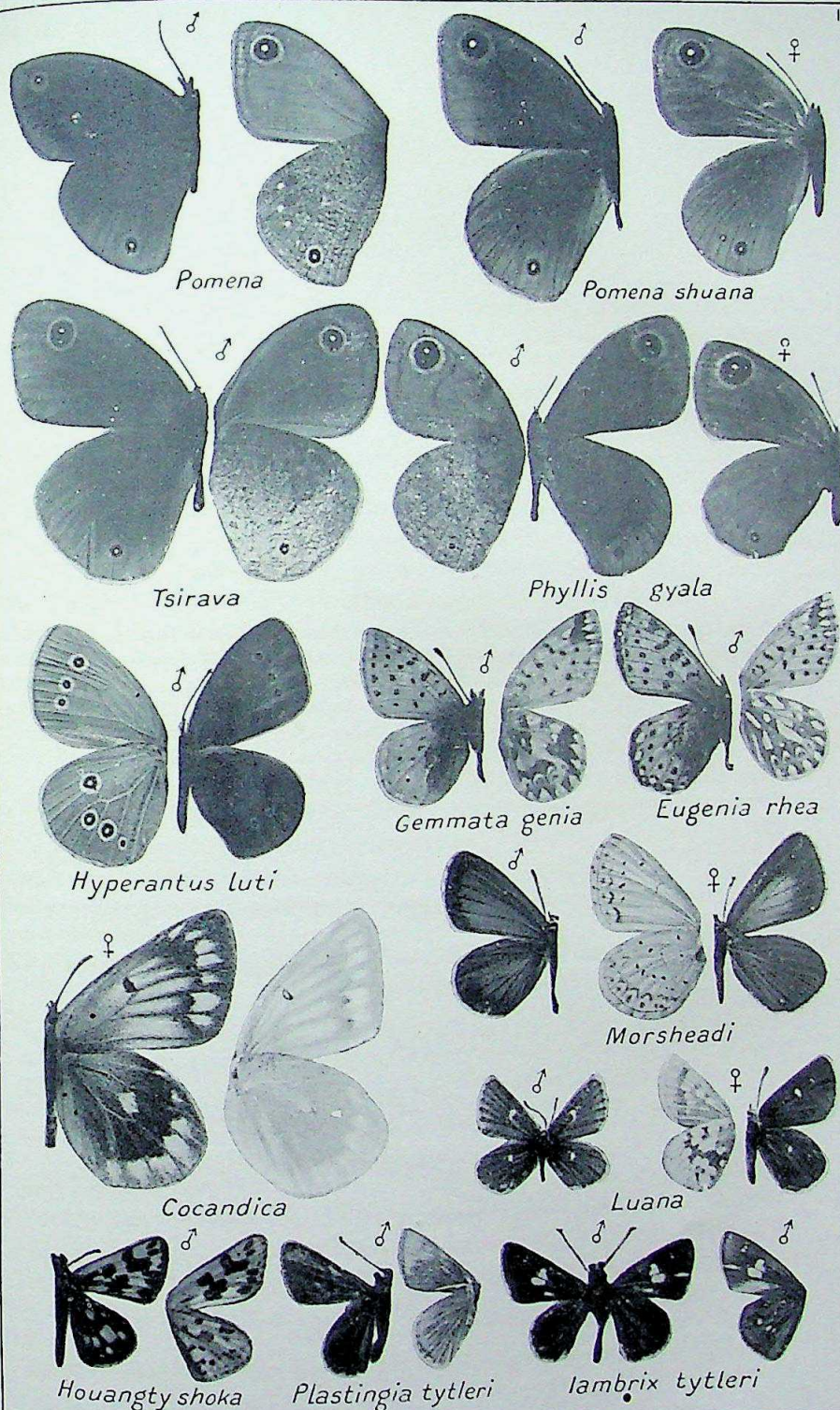
95. *Argynnis gemmata* genis, Fruh. (see plate). 24 specimens at 12-16,000 feet in the high country south of the Tsang Po in September; in several the silver colouring on the underside is replaced by yellow, and this variety may be called *fulva*, nov.

96. *Argynnis eugenia* rosea, Grout. (see plate). 12 specimens caught at 12-16,000 feet at Lu on the Tsang Po and in the high country to the south in August and September.

These two species are very similar in general appearance. In *genis* vein 10 is omitted at the end of the cell, thus it falls in true *Argynnis*, while *rosea* appertains to Moore's genus *Poloria*, as this vein is emitted well beyond the cell. I would, however, remark that this feature is of little value from a generic point of view, as in *clara*, Blanch. the vein is emitted well after the end of the cell and in the race *maai*, Fruh. just after that point. In the *gemmata* group, which includes *eugenia* and *altissima*, the pattern of the hindwing below does not vary appreciably; in *gemmata*. But, and its dwarf race *genis*, the silver spot at the centre of the costa is more or less upright and square in shape, also the cinnamon red areas are broad and prominent; in *altissima* and *eugenia* the spot mentioned is sloping and the red areas are indistinct. Great if my identification is correct, is remarkable in that the narrow black band, prominent in the other allied species, is absent and the cilia are concolorous with the ground colour. *Altissima* appears to be a good species, vein 10 crosses just after the end of the cell; the forewing is sharply pointed and the outer margin straight below that point; all the silver markings on the underside are narrow and elongated, while the black spot near the base of cell 2 on the forewing above is placed nearer the outer margin than in the other species of the group. *Eugenia*, Evermann, is a species lying from South Siberia, through West China and Tibet to the Himalayas; vein 10 crosses well beyond the end of the cell, its origin being equidistant between that point and the origin of vein 2; in the nymetypical Northern form the large silver spot crossing the end of the cell on the hindwing below is quite short; in the Tibetan race *rosea*, described from Ambo, it is elongate as in *gemmata*. MacKinnon, de N., from the Himalayas, is, I am convinced, a race of *eugenia* and has nothing new below are rather more prominent and the cilia above are concolorous with the ground colour instead of being whitish.

97. *Melitae didyma* jentel, Oberth. 102 specimens in the Po Chu Valley and on the Tsang Po between Gyats and Du and just beyond the Kangleh narrows to *peaka* from Eastern Tibet. The specimens appear to be strongly developed, below very brick red, the forewing often without any silver markings. Specimens I have from Gyats are very similar differing only in the lesser development of the outer discal band on the forewing above. Both are very different from the small dull Chumbi Valley *didyma*, M. and are nearer to *lentula*, M. from Kashmir, though

98. *Melitae didyma* agar, Oberth. 57 specimens mostly on the Tsang Po between Gyats and Lasplo at 8-14,000 feet in July and August and a few



TIBETAN BUTTERFLIES.

in the Karpo Valley to the south at 12-14,000 feet in September. There seems no justification for separating *agar* from *didyma*. Capt. Bailey's specimens are practically identical with Seitz's figures of *agar*; in many of the females there is a good deal of the orange ground colour showing through.

99. *Pseudergois wedah*, Koll. 3 specimens on the Lower Tsang Po at 5,000 feet in June and at Dhirang, 5,000 feet, October.

100. *Calinaga davidis*, Ober. 1 ♂, Lower Tsang Po, 3,000 feet, June.

101. *Libythea celtis lepita*, M. 37 specimens on the Lower Tsang Po and in the Po Chu Valley, 4-8,000 feet, June and early July.

102. *Hyporion lama*, Leech. One specimen at Gyala on the Tsang Po at 9,800 feet on July 17th. The single male obtained agrees closely with *lama*, but the two upper spots of the ferruginous sub-marginal band are white and divide discal spots on both wings which are more developed. The underside is a replica in every way of the upperside, but the ground colour is dark ferruginous; there is a pale yellow spot in the cell of both wings and the white spots of the upperside are developed into a continuous well defined sinuate band across both wings; the outer margins are paler.

103. *Dodona dipæa*, Hewit. 6 specimens, Lower Tsang Po and Po Chu Valley, 3-8,000 feet, June and early July.

104. *Dodona eugenes*, Bates. 5 specimens in the same localities and at Dewangiri, 6,000 feet, November.

105. *Dodona ouida*, M. 6 ♂, Lower Tsang Po, 7,000 feet, June.

106. *Dodona adonira*, Hewit. 7 ♂, Lower Tsang Po, 3-6,000 feet, June.

107. *Stiboges nymphidia*, Butl. 2 ♂ and 1 ♀, Lower Tsang Po, early June, 3-6,000 feet.

108. *Papilio aeacus*, Fldr. 1 ♂, Lower Tsang Po, 3,000 feet, June.

109. *Papilio varuna astorion*, Wd. 1 ♂, Dhirang, 7,000 feet, October.

110. *Papilio philoxenus polyeuctes*, Doubl. 2 ♂, same locality.

111. *Papilio machaon sikkimensis*, M. 2 ♂, Po Chu Valley, 11,000 feet, June and 1 ♂ on the Tsang Po near Tu, 10,000 feet, August.

112. *Papilio helenus*, L. 3 ♂.

113. *Papilio chaon*, Westw. 1 ♂.

114. *Papilio janaka*, M. 1 ♂.

115. *Papilio protenor euprotenor*, Fruh. 1 ♀.

116. *Papilio rhetenor*, Westw. 1 ♂.

117. *Papilio polyctor triumphator*, Fruh. 2 ♂.

Nos. 112-117, Lower Tsang Po, 3-6,000 feet, June.

118. *Papilio polyctor ganesa*, M. 1 ♂, Nyamjang Valley, 7,000 feet, October.

119. *Papilio krishna*, M. 1 ♂.

120. *Papilio glycerion*, Gray. 6 specimens.

121. *Papilio eurous sikkimica*, Heron. 6 specimens.

122. *Papilio cloanthus*, Westw. 1 ♂.

123. *Papilio bathycles chiron*, Wallace. 1 ♂.

124. *Papilio sarpedon*, L. 1 ♂.

Nos. 119-124, Lower Tsang Po, 3-6,000 feet, June.

125. *Parnassius epaphus sikkimensis*, Elw. 108 specimens on the Putreng La and the passes to the south of the Tsang Po, August and September, 14,500 to 16,300 feet. Amongst them several virgin females.

126. *Parnassius imperator intermedia*, Rothsch. 32 specimens on the Konghbo Nga La and the passes to the south of the Tsang Po, August and September, 14,500 to 16,300 feet. This race is quite different in appearance to the very distinct yellow race *augustus*, Fruh. from the Chumbi Valley; the ground colour is pure white and the black dusting of the nymotypical form is absent.

127. *Delias belladonna lativitta*, Leech. 11 specimens in the Po Chu Valley and at Pemako Chung on the Tsang Po, 7-9,000 feet, July.

128. *Delias belladonna ithiela*, But. 6 specimens, Lower Tsang Po, 3-6,000 feet, June.

129. *Aporia hippia*, Brem. 65 specimens, Po Chu Valley and on the Tsang Po between Gyal and Pe, 7,500-10,500 feet, June and July.

130. *Aporia bieti*, Oberth. 12 specimens, Po Chu Valley, 11,000 feet, end of June and early July.

131. *Aporia delavayi*, Oberth. 10 specimens in the Po Chu Valley and on the Tsang Po below Pe 8,000-9,500 feet, end of June to early August.

132. *Aporia agathon*, Gray. 22 specimens, Lagong on the Lower Tsang Po and the Po Chu Valley, 5-8,000 feet, end of June and early July.

133. *Aporia larraldei melania*, Oberth. 2 ♂ and 1 ♀ in the Po Chu Valley and at Pemako Chung on the Tsang Po, July, 10,000 feet.

The specimens obtained were more or less intermediate between *melania* and *paracraea*, de N. below as *paracraea*, above as *melania*: *harrietae*, de N. from the Bhutan Frontier, of which as far as I know only the type pair exists in the Calcutta Museum, is also very close. The variation in *larraldei* seems to be very similar to that in *agathon* and possibly many of the so-called races are really only varieties of the pale nymotypical form.

134. *Pieris brassicae*, L. 5 specimens between Dhirang and Tawang at 5-10,000 feet in October.

135. *Pieris canidia*, Spar. 50 specimens, in all the districts traversed at 4,800 to 13,000 feet.

136. *Pieris melete montana*, Verity. 26 specimens, Lower Tsang Po and Po Chu Valleys, 5-8,000 feet, June and July; Dhirang and the Nyamjang Valley, 6,000 feet, October. All the specimens belonged to the large Eastern race; there was nothing approaching the dark Chumbi Valley form *melania*, Rob.

137. *Pieris chumbiensis*, de N. 1 ♀ on the Nyama La, 14,500 feet, July 12th. The markings are wider than usual, but the species is very variable.

138. *Huphina nadina*, Lucas. 4 ♂ of the dry season form, Dewangiri, 1,500 feet, November.

139. *Appias indra*, M. 2 ♂, Lower Tsang Po, 3-5,000 feet, May and June.

140. *Appias lalage*, Doubl. 34 specimens, Lower Tsang Po, 5,000 feet, May and June and at Dewangiri, 1,500 feet, November.

141. *Gonepteryx amintha*, Blanch. 6 specimens, Lower Tsang Po and the Po Chu Valley, 5-7,000 feet, June and July.

142. *Gonepteryx alvinda*, Blanch. 19 specimens between Pe and Shu on the Tsang Po, 9-10,000 feet, July and August. I have identified this species

from Seitz's figures and very brief description; they do not, however, differ from the specimens caught by Capt. Bailey in 1911 and identified by Mr. South as *aspasia*. Men. (J. B. N. H. S. xxii. 603). *Alvinda* appears to differ from the Indian *zaueka*, M. in that the outer margin of the hindwing is not crenulate between the tail at the end of vein 3 and the anal angle.

143. *Colias berrylla*, Fawe. 10 specimens in the high country south of the Tsang Po at 14-16,000 feet, in September. All the specimens very worn. *Berrylla* seems to connect *motium*, Ober. with *ladakensis*, Fd. The females obtained were pale yellow like the males.

144. *Colias cocandica*, Ersch. (see plate). 7 specimens caught with *berrylla* and a few at Lu on the Tsang Po, 14,000 feet, August. I leave the correct name to a *Colias* expert.

145. *Dercas lycorias*, Doubl. 8 specimens, Lower Tsang Po, 5,000 feet, May and near Dhirang, 7,000 feet, October.

146. *Terias laeta*, Bdl. 2 ♂, Nyamjang Valley, 6,000 feet, October.

147. *Terias silhetana*, Wallace. 1 ♂, Dewangiri, 1,500 feet, November.

148. *Terias hecabe*, L. 7 specimens, Dhirang and Nyamjang Valley, 6-7,000 feet, October.

149. *Cyaniris marginata*, de N. 1 ♂, Lower Tsang Po, 4,000 feet, June.

150. *Cyaniris albocerulea*, M. 2 ♂, Lower Tsang Po, 4-7,000 feet, June.

151. *Cyaniris dilecta*, M. 1 ♂, Dhirang, 6,000 feet, October.

152. *Cyaniris argiolus jynsteana*, de N. 15 specimens, Lower Tsang Po and Po Chu Valley, 4-8,000 feet, May and June; also near Dhirang and the Nyamjang Valley, 6,000 feet, October. One of the specimens obtained in the first-named locality is quite different to the remainder, it resembles *coelestina*, Koll, in having the black border on the forewing above narrow, but widening at the apex, but the cilia are prominently chequered with black at the ends of the veins and there is an indistinct pale discal patch; below the spots are arranged as in the *argiolus* group, the spots on the forewing are, however, linear, that in space 3 being oblique, while the spots on the hindwing are large, prominent and rounded, 5 that in space 3 being produced outwardly.

153. *Cyaniris oreas*, Leech. 80 specimens mostly in the Po Chu Valley, 7-8,000 feet, June and July; a few at Migyitun, 10,000 feet, September and at Tawang, 8,000 feet, October. The Migyitun specimens averaged a good deal smaller.

154. *Cyaniris morsheadi*, n. sp. (see plate). 64 specimens on the Tsang Po between Gyala and Lapsa, 9-14,000 feet, July and August; also a few between the Khamba La and the Kongma La, south of the river, 12,500 feet, September.

Male dark-blue above, a good deal darker than is usual in this genus; the black border very broad, rather broader than in *transpecta*, M., of uniform width, curved round somewhat at the apex of the forewing: costa of the forewing very narrowly black, the costa and inner margin of the hindwing dusky. Below the pattern is exactly similar to that in the *argiolus-oreas* group; all the spots are small and rounded, everywhere complete: on the hind wing there is a greenish tinge increasing in intensity towards the base. In the female the blue colouration is very dark and restricted to a large patch in the middle, the rest of the forewing being black; there is black spot at the end of the cell; the hindwing is uniform black with an obscure deep-blue sheen towards the base. Size intermediate between *coelestina* and

huegeli, M. The species is evidently a member of the *argiolus* group and may be easily recognised by the broad black outer margin in the male.

155. *Lycæna younghusbandi*, Elwes. 2 ♂, Yartotra La, 16,000 feet, September.

156. *Lycæna semiargus annulata*, Elwes. 6 specimens, Yarlung Valley, 13,000 feet, early September.

157. *Lycæna lanty*, Oberth. 1 ♂, Po Chu Valley, 8,500 feet, July. The specimen is very worn and the identification is in consequence rather open to doubt.

158. *Lycæna stoliczana*, Fldr. 43 specimens. A few in the Po Chu Valley, 10,500 feet, July; the bulk on the Tsang Po between Tu and Rongchakar, August; a single female in September at 12,500 feet between the Khama La and the Kongma La. Extremely variable.

159. *Lycæna luana*, n. sp (see plate). 6 specimens at Lu, 15,000 feet, August 19th; on the Putrang La, 16,300 feet, August 25th; on the Gyemo La, 15,000 feet, Sept. 4th; on the Le La, 12,000 feet, Sept. 23rd.

Male above very dark-brown obscurely powdered with white, more especially so towards the outer margin; cilia broadly pure white, with a minute terminal black spot at the end of each vein; in the female the white dusting is obsolete. On both wings there is a prominent white spot at the end of the cell, which in some males on the forewing is extended inwards along the sub-median vein as a narrow streak to one-third distance from the base. Forewing below base to half way between the end of the cell and the margin very pale plumbeous, beyond cream white; the inner edge of the white area is parallel to the margin as far as vein 4 and then is bent inwards to the costa; on this area there is a similarly bent ferruginous line which is prominent towards the costa and nearly obsolete towards the inner margin: a prominent white spot at the end of the cell. Hindwing, extreme base pale greenish white, followed by a ferruginous area to well beyond the cell, which is again followed by a broad cream white area as on the forewing: on the ferruginous area there are a number of large white spots, viz., 4 basal, one at the end of the cell and a row of 5 on the disc, the lower ones being adjacent to the pale outer area; cilia as above. Eyes smooth. The upperside of the female has been described above. Below the hindwing resembles the male; the forewing may be described as pale silky plumbeous, with the following portion cream white, viz., a spot in and another at the end of the cell, the outer margin broadly and a discal row of contiguous spots bent inwards in the middle and increasing in size towards the costa. Size of *Lycæna iris*, Stdg.

A very distinct little species, with no near ally that I know of; above there is a general resemblance to Seitz's figure of *Lycæna astrarche* ab *artaxerxes*, Fab. but below I know of nothing at all to compare it with. The antennæ are white below and alternately black and white above; venation as in *Cyaniris*.

160. *Lycæna pheretes*, Hbn. 5 ♂ and 1 ♀ mostly in the Po Chu Valley and few at Gyala on the Tsang Po, 9-10,500 feet, July and early August. This may turn out to be a new race of *pheretes*. It resembles in appearance *lehana*, M., but differs remarkably in size, being even larger than true *pheretes*, more as *stoliczana*, Fd. Forewing pointed as in *asiatica*, El.; on the upperside of the hindwing there is a prominent row of black sub-marginal spots, which other forms of *pheretes* do not appear to possess. Below the markings are very variable, but do not differ from those prevailing in other forms. The female is dark-brown with some very dark indigo blue at the bases. If a new name is needed, I propose *major*.

161. *Lycena asiatica*, Elwes. 25 specimens at 12-16,000 feet; a few on either side of the Putrang La, late in August, and the bulk in the high country south of the Tsang Po in September.
162. *Zizera maha*, Koll. 22 specimens on the Lower Tsang Po and in the Po Chu Valley, June and July, 4-8,000 feet; also a few near Dhirang, 6,000 feet, October. Many of the specimens are referable to *opalina*, Pouj.
163. *Everes argiades dipora*, M. 1 ♂ Dhirang, 6,500 feet, October.
164. *Everes ion*, Leech. 17 specimens on the Tsang Po between Pe and Tu, 10,000 feet, early August.
165. *Orthomiella pontis*, Elwes. 1 ♂, Lower Tsang Po, 5,500 feet, June.
166. *Polyommatus boeticus*, L. 1 ♂ at Tu on the Tsang Po, 10,000 feet, August and 1 ♀, Dhirang, 6,500 feet, October.
167. *Zephyrus duma*, Hewit. 1 ♀ in the Char Chu Valley at 12,000 feet in September. A somewhat surprising capture.
168. *Zephyrus surioia*, Tytler. 1 ♀ in perfect condition at Pemako Chung on the Tsang Po, 9,000 feet, July 23rd. The butterfly has hitherto only been found at Suroi Fui in the Manipur district. This remarkable bright metallic blue female is not difficult to identify.
169. *Zephyrus bieti*, Oberth. 7 specimens between Gyala and Tu on the Tsang Po, 9-10,000 feet, middle of July to middle of August. Rather larger than usual: the orange spots on the disc of the forewing in the female are smaller than usual.
170. *Zephyrus icana*. M. 1 ♂, near Tu on the Tsang Po, 10,000 feet, Aug. 10th. Agreeing well as regards the upperside with typical *icana* from Kulu, but below there is no ferruginous tinge at all; the ground colour is rather pale brown and the bands dark-brown while the silver lining to the discal bands is very obscure.
171. *Ilerda viridipunctata*, de N. 1 ♂ Lower Tsang Po, 5,000 feet, June and 1 ♂ Nyamjang Valley, 6,000 feet, October.
172. *Ilerda moorei*, Hewit. 23 specimens mostly in the Po Chu Valley and on the Tsang Po between Pe and Dokar, 9-10,000 feet, June and July also a few between Dhirang and the Nyamjang Valley, 6-8,000 feet, October.
173. *Chrysopanus phlaas*, L. 83 specimens, a few in the Po Chu Valley at 8-10,000 feet, June; the majority on the Tsang Po between Pemako Chung and Shu, July, and in the high country to the south in August, 12-15,000 feet; a few at 7,000 feet in the Nyamjang Valley in October. Very similar to the European form.
174. *Arphnæus lohita*, Horsf. 1 ♂, Lower Tsang Po, 3,000 feet, June.
175. *Arhopala rama*, Koll. 3 specimens, Po Chu Valley, early July, 7-8,000 feet.
176. *Rapala nissa*, Koll. A male in the Po Chu Valley, 8,000 feet, end of June and a female at Pemako Chung, 9,000 feet, 1 July. The specimens differ somewhat from the typical form in that the orange areas above are enlarged and below the ground colour is darker than usual.
177. *Chliaria kina*, Hewit. 2 ♂, Lower Tsang, 5-7,000 feet, early June.
178. *Celaenorhinus pyrrha*, de N. 1 ♀, Lower Tsang Po, 4,000 feet, June.
179. *Celaenorhinus leucocera*, Koll. 1 ♀, locality as last.
180. *Celaenorhinus pulomaya*, M. 2 specimens, near Dhirang, 6,500 feet, October.

181. *Celaenorrhinus thibetana*, Mab. 4 specimens in the Po Chu Valley, 8,000 feet, end of June.

182. *Tagiades pralaya*, M. 2 ♂ Lower Tsang Po, 3,000 feet, June.

183. *Pamphila dieckmanni*, Græser. 3 specimens, Po Chu Valley, 8-9,000 feet, early July.

184. *Pamphila houangty shoka*, subsp. n. (See plate). 16 specimens mostly in the Po Chu Valley and a few on the Tsang Po between Pe and Tu, June and July, 8-10,500 feet.

Above as *houangty*, Oberth, but the black markings enlarged, the lower discal spot on the forewing being extended to the inner margin. The hindwing is black bearing the following yellow spots, a medium sized one in the middle of the cell, with a small one on the costa above it nearer the outer margin, a discal row of 3 spots, of which the upper one is very large and has outwardly beyond it on either side a small spot near the margin. Below the markings are as above, but those towards the apex are obsolescent; hindwing as above, but the black ground colour is overlaid with yellow brown, only differing very slightly in shade from the yellow markings. Rather larger than *houangty*. *Houangty* is yellow with black markings, while *shoka* is black with yellow markings.

185. *Ochus subvittatus*, M. 3 specimens, Lower Tsang Po, early June, 3,000 feet.

186. *Sebastonyma dolopia*, Hewit. 1 ♂, Lower Tsang Po, 4,000 feet, June.

187. *Notocrypta feisthamelii*, Bdv. 1 ♂, Lower Tsang Po, 4,500 feet, June.

188. *Augiades bouddha*, Mab. 9 ♂, Po Chu Valley, 7-9,000 feet, end of June and early July.

189. *Halpe homolea*, Hewit. 7 ♂ and 1 ♀, Lower Tsang Po, 3-5,000 feet, June.

190. *Halpe aina*, de N. 1 ♀, Lower Tsang Po, 5,000 feet, June.

191. *Parnara aurociliata*, Elwes and Edw. 3 ♂, Lower Tsang Po, 5-6,000 feet, June. The specimens work out to *aurociliata* by Elwes and Edwards' key; the fringes are bright yellow, but otherwise the description does not altogether agree. On the forewing there is a single spot in the cell against the lower edge; a discal row of spots in spaces 2 to 4, that in 2 quadrate, that in 3 also quadrate, but half the size, that in 4 minute and rounded; the usual small apical spots in 6-8; no spot in 1 a.

192. *Parnara calaca*, M. 2 ♀, near Dhirang, 6,000 feet, October.

Note.—I have taken the opportunity to figure two species, of which I have recently published descriptions, viz.—

Iambrix tytleri, Evans, and *Plastingia tytleri*, Evans, from Manipur.

NOTES ON THE BIRDS OF UPPER ASSAM.

BY

H. STEVENS, M B.O.U.

(With a plate.)

ADDITIONS AND ERRATA TO PART I.

82 A. *Bhringa remifer* (Temm.) [339].—The Lesser Racket-tailed Drongo.

Resident throughout the whole area in forest. It is no unusual occurrence in ones' rambles in the dense evergreen forest to come upon a pair of these Drongos in company with a large and varied assortment of small birds, Warblers, Babblers, &c., in such a quarter that allows of the penetration of the sun's rays. The whole surrounding vegetation is then alive with movement and twitterings. It can be seen to what purpose and how beautifully nature has adapted the seemingly extraordinary development of the elongated tail feathers with the spatulate extremity to serve as a rudder during its aerial dives within a confined and obstructed space. Both this and the next species are strictly forest Drongos though occasionally frequent the outskirts of the forest.

ERRATA AND ADDITIONS TO PART I.

- Page 235, line 19, for fragmentary read frequent.
 " 238, " 11, from the bottom, for nearly read near ally.
 " 239, " 8 " " " for McClell read [McClell.]
 " 241, " 12, for Hodgs. read Blyth.
 " 242, " 32, for *Myiophoneus* read *Myiophonus*.
 " 246, " 4, for 14-4-04 read 14-6-04.
 " 249, " 1, for dusty read dusky.
 " 249, " 2, for dusty read dusky.
 " 253, " 17, for move read prove.
 " 253, " 34 add June.
 " 254, " 14, for 21-6-04 read 21-7-04.
 " 255, " 23, for Chota Tinrai read Chota Tingrai
 " 257, " 20, for Poobamukh read Pobhamukh.
 " 260, " 1, for *svecica* read *suecica*.
 " 262, " 6, from bottom, for Gurrung, January read Gurrung Jan.
 " 263, " 16, from bottom, for *purctulata* read *punctulata*.
 " 264, " 14, from top, for ♂ read ♀.
 " 266, " 10, from bottom, for hold read hoed.
 " 268, " 24, for *Arachnethera* read *Arachnothera*.
 " 268, " 30 " " "
 " 268, " 9, from bottom, for *ignipectus* read *ignipectus*.

PART II

244. *Pitta nipalensis nipalensis* (Hodgs.) [927].—The Blue-naped Pitta.

Occurs throughout the plains in the cold weather at all events. Margherita, December, February, March; Rungagora, January; Dejoo, 4-6-10, a pair attracted my attention with their whistling notes, a few days later Pittas were much in evidence in some scrub jungle close by the bungalow.

245. *Pitta cucullata*, Hart. [935].—The Green-breasted Pitta.

Rare resident at foot of hills in North Lakhimpur; Dejoo, single record for adult, 24-5-07, ♀, taken on nest containing four eggs; the latter smashed owing to falling timber when clearing the forest.

Dejoo, 11-8-04, ♀ juv., occurs also at Margherita. Failed to meet with it in the plains. Iris dark brown; orbits plumbeous; bill black; tarsus fleshy plumbeous.

246. *Serilophus rubropygia* (Hodgs.) [943].—Hodgson's Broadbill.

Resident, though possibly local migratory, occurs throughout the plains in evergreen forest and well wooded cultivated tracts, generally in small parties. It would be no difficult matter to decimate a party of these Broadbills as they are loathe to be dispersed when fired at, even at close range; they have a sweet whistling call.

Margherita, November; Rungagora, February, March; Dejoo, December; Seajuli, November; Dhoolohat, October; North Lakhimpur, July, August.

247. *Psarismus dalhousie* (Jameson.) [944].—The Long-tailed Broadbill.

Resident, it keeps to the dense forests in pairs at the breeding season, gregarious in parties to the extent of a dozen or more in the cold season when it frequents any open scrub growth or land interspersed with trees in the vicinity of habitations, then extremely familiar, very partial to bamboo "baris" or jungle interspersed with bamboos.

Joyling, 20-9-08, a large party flew into the verandah porch of the Doctor's bungalow. Such an incident is not a particularly uncommon occurrence. Reported on other occasions similar such cases.

Dejoo, 4-1-09, a party noted at early morning: the jerking of their tails was most noticeable. Silonibari, 31-8-11, a small party, four to six birds, parents and young? attracted my attention with their plaintive whistling; 21-10-11, in evidence about now, noted in the garden; a few days previously also seen in scrub growth along trolley line.

Rungagora, April; Dejoo, December, January, February, (July, August, immatures). Iris light stone brown; orbits yellow; bill green; tip of upper and lower mandible light blue, lower mandible orange-yellow; tarsus pale green, claws horny.

248. *Picus striolatus*, Blyth. [948].—The Little Scaly-bellied Woodpecker.
Gecinulus striolatus, Blanford, F.B.I., Vol. iii., p. 20.

Resident on the "north bank," right bank of the Bramapootra at all events in the wide expanse of open grass and reed land adjacent to the main rivers interspersed with Simul trees (*Bombax malabaricum*). Komolabari, 1-13-9-04, ♂; Boduti, 1-11-07, ♂.*

As might naturally be expected in a heavily forested region the woodpeckers are well represented and by no fewer than ten species irrespective of the two Piculets.

249. *Picus occipitalis* Vig. [950].—The Black-naped Green Woodpecker.

Gecinulus occipitalis, Blanford, F.B.I., Vol. iii., p. 22.

Plentifully distributed throughout the whole district.

250. *Picus chlorolophus chlorolophus*, Vieill. [951].—The Small Himalayan Yellow-naped Woodpecker.

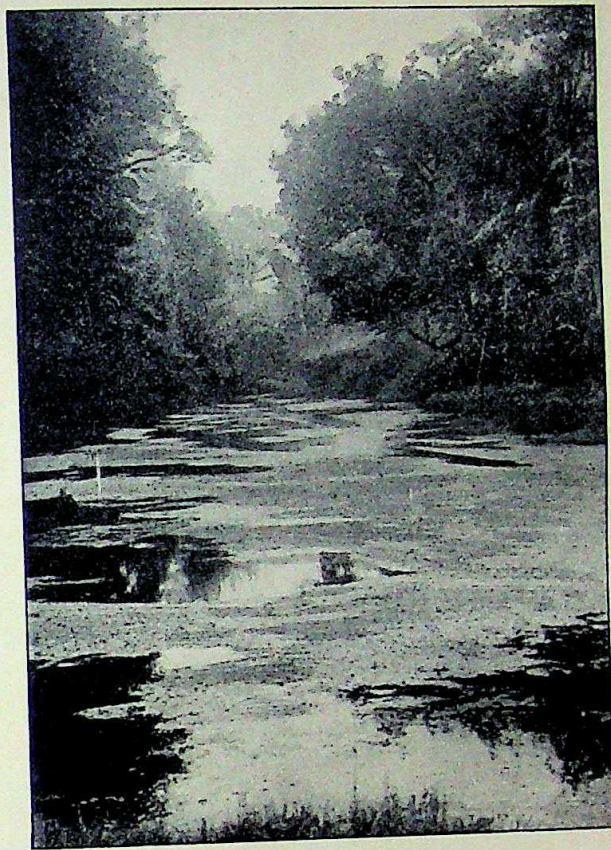
Gecinulus chlorolophus, Blanford, F.B.I., Vol. ii., p. 23.

Commonly distributed, more partial to the open tracts of country.

251. *Chrysophlegma flavinucha* (Gould.) [955].—The Large Yellow-naped Woodpecker.

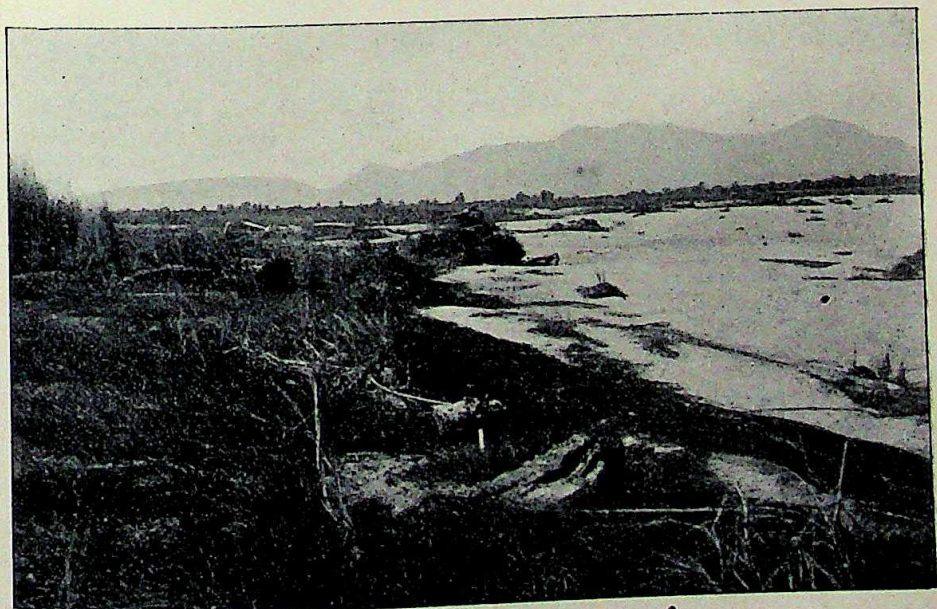
Locally distributed throughout the whole district. Oates' numerous genera in this family, *Picidae*, are retained though so much sub-division is probably quite unnecessary.

252. *Gecinulus grantia* (McClell.) [958].—The Northern Pale-headed Woodpecker.



H. S., Photo.

GURRUNG JAN, FOREST STREAM OFF R. DIBRU, RUNGAGORA, DIBRUGARH.
Haunts of *Asarcornis scutulata*, &c., &c.



H. S., Photo.

SUBANSIRI "CHURS," HESSAMARA, LAKHIMPUR.
Haunts of *Laticilla cinerascens*, *Oreicola jerdoni*, *Saxicola leucura*, *Asio flammeus*,
Acrocephalus agricola, &c., &c.
CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

THE BIRDS OF UPPER ASSAM.

विषय संख्या	V. 23/3	590.5 B63 J
आगत पंजिका संख्या	<u>48,914</u>	
पुस्तकालय		
गुरुकुल कांगड़ी विश्वविद्यालय		

Locally distributed. In the Dibrugarh district specimens secured at Limbuguri, Bozaltoli; Tinsukia, in bamboo jungle. Failed to meet with it in North Lakhimpur.

Iris brown; bill whitish-blue; orbital skin grey; tarsus plumbeous green; claws bluish-horny.

253. *Dryobates macei macei* (Vieill.) [967].—The Fulvous-breasted Pied Woodpecker.

Dendrocopus macii, Blandford, F.B.I., Vol. iii., p. 39.

The Common Pied Woodpecker in all descriptions of forest and open wooded country.

254. *Pyrrhopicus pyrrhotis* (Hodgs.) [978].—The Red-eared Bay Woodpecker.

Locally distributed in the plains. Rungagora, 10-1-04, ♀, secured, one of a small party. Observed in the vicinity of Beni; Abor-Miri hills, North Frontier.

255. *Micropternus phaiiceps phaiiceps*, Blyth. [983].—The Northern Rufous Woodpecker.

Plentifully distributed throughout the whole district.

256. *Chrysocolaptes gutticristatus* (Tickell.) [992].—Tickell's Golden-backed Woodpecker.

Commonly occurs in all well forested areas.

The vivid colours of this handsome woodpecker are particularly noticeable when in flight across any open space in the forest and its loud harsh call further attracts attention.

257. *Hemilophus pulverulentus* (Temm.) [996].—The Great Slaty Woodpecker.

Only locally distributed in the plains, Rungagora, forest right bank of Dibu R. More plentiful in the heavy forest of the foot hills in North Lakhimpur, occasionally occurs in small parties of six to eight or thereabouts.

♀. Iris dark brown; bill bluish-white; black on culmen and tip of both mandibles; orbits plumbeous; tarsus bluish-plumbeous; claws horny.

258. *Picumnus innominatus innominatus*, Burton. [1001].—The Speckled Piculet.

Occurs throughout the plains although not as plentiful as *S. ochracea*.

259. *Sasia ochracea*, Hodgs. [1002].—The Rufous Piculet.

Similar distribution as *P. i. innominatus*, equally suited in reeds, bamboo, secondary scrub and dense swampy forest.

260. *Lynx torquilla japonica*, Bp. [1003].—The Eastern Wryneck.

Lynx torquilla, Blandford, F. B. I., Vol. iii., p. 78.

A cold season migrant. The below records constitute the earliest arrivals and the latest departures, numerous records intervening dates during the cold weather months. Frequently flushed from off the ground in low open scrub or land under tea cultivation, unobtrusive in its habits and does not shun observation. Earliest arrivals—Dejoo, North Lakhimpur, 7-9-08*, 9-9-08*, 11-9-08, ♂, 17-9-07*; Silonibari, N. Lakhimpur, 14-9-11*; foraging on ground, seen two days previously, only to-day was able to make certain of identification; Komolabari, Sibsagar, 20-9-04, ♀; Rungagora, Dibrugarh, 5-10-02, ♀, 20-10-03, ♂, probably earlier arrivals overlooked. Latest departures—Dejoo, North Lakhimpur, 18-4-08, ♂ ♀*, male only.

secured; Rungagora, Dibrugarh, 10-4-02, 27-3-02, ♂, 27-3-03, ♀; Dejo, North Lakhimpur, 15-3-09*.

261. *Megalæma marshallorum marshallorum*, Swinh. [1006].—The Great Himalayan Barbet.

Restricted to the hill regions. The Daphla, Abor-Miri Hills and Naga hills above Margherita.

Derpai, base of hills, entrance to Subansiri Gorge, 20-11-05, ♀, this specimen was watched by Mr. Lindsay Alexander and seen to be molested and eventually killed by crows during the day. An examination on dissection showed a dislocated neck. This incident was no doubt prompted by similar jealousies after the manner that crows peck an invalid or injured member of their fraternity to death or otherwise take at a disadvantage some unoffending stranger, with this exception unknown at the foot of the hills in North Lakhimpur. Beni, Abor-Miri hills, 7-2-06, observed in parties of a dozen or thereabouts.

262. *Thereiceryx lineatus lineatus* (Vieill.) [1009].—The Lineated Barbet. Generally distributed throughout the plains.

263. *Cyanops asiaticus asiaticus* (Lath.) [—1012]. The Blue-throated Barbet. Common throughout the plains. Dejo River, upper reaches, 5-4-07; procured a specimen with nape back and breast splashed with red.

264. *Cyanops cyanotis* (Blyth). [1016].—The Blue-eared Barbet.

North Lakhimpur, approximate distance five miles from base of hills, 3-6-04, ♂, 25-6-04, ♂; otherwise no other records available. More evidence as to the status of this Barbet in Upper Assam is desirable.

265. *Cyanops franklini franklini* (Blyth). [1017].—The Golden-throated Barbet.

A series collected on the north frontier in the Abor-Miri hills where it was comparatively numerous.

266. *Xantholæma hæmatocephalus hæmatocephalus* (P. L. S. Mull.) [1019].—The Crimson-breasted Barbet.

Plentiful in the plains on the grass lands sparsely interspersed with trees, chiefly Simal (*Bombax malabaricum*), absent from the heavy forests. Maijan, Dibrugarh; Komolabari, Sibsagar: north bank of the Bramapootra, Dejo, 8-3-10*; Silonibari, 4-8-11*. These two latter records are somewhat doubtful as no specimens were secured. In any case it must be a rare bird at the foot of the hills in North Lakhimpur. Observed at Tezpur, Lower Assam, in February.

267. *Coracias affinis*, McClelland. [1023].—The Burmese Roller.

Commonly distributed throughout the plains. A familiar object to the most casual observer. Often to be seen hawking for winged termites when they emerge at evening in company with Drongos and Bulbuls, such an occasion noted at Dejo, 5-12-10.

268. *Eurystomus orientalis calonyx*, Sharpe. [1025].—The Broad-billed Roller.

Eurystomus orientalis, Blanford, F. B. I., Vol. iii., p. 107. Locally distributed throughout the plains, more partial to the heavily forested tracts than *Coracias affinis*, and plentiful at the base of the hills. Margherita, North Lakhimpur, Guijan to Digitarung (Plains), Dibrugarh.

269. *Merops orientalis birmanus*, Neum. [1026].—The Burmese Bee-eater. *Merops viridis*, Blanford, F. B. I., Vol. iii., p. 110.

Essentially restricted to the grass lands in the plains interspersed with patches of light forest or scattered trees. Dinjan to Panitola, Dibrugarh 20-12-03, ♀; Komolabari, Sibsagar, 1-15-9-04, a series collected.

270. *Merops philippinus philippinus*, L. [1027].—Blue-tailed Bee-eater.

Occurs throughout the plains though migratory and locally distributed.

Rungagora (Plains) five miles below on R. Dibru, 16-3-03*, hawking for food at evening dusk, Rungagora, Dibrugarh, 6-4-02*; Maijan (Plains), Dibrugarh, April 1901; Rungagora (Plains), Dibrugarh, 6-7-03, ♂; Dejoo (Base of hills), North Lakhimpur, 3-6-10*, several noted in the "hoolahs" in a quarter of the garden a day or so before the burst of the south-west monsoon; Dejoo, 26-6-08. Dhoolohat, 2-7-11, possibly noticed some few days previously although no note made at the time; Dejoo, 5-7-04, ♀, 13-7-04, ♂ ♀, 16-7-04, ♂, ♂ juv., 8-7-10*, in some numbers in the "hoolahs" in garden, 4-9-08, ♀; Silonibari, 4-9-11, still in evidence and again on 17-9-11 adults noted; 30-9-11, wet weather at the time; Dejoo, 17-10-04, ♂ ad. ♂ ad.; Silonibari, 18-10-11, single; Dejoo, 23-10-10, numbers congregated in the light scrub growth on the left bank of the Dejoo R. near the Runganuddie at the Mukh enlivening the air with their whistling and gyrations. Is this preparatory to migration? Bipuria, Bodutird, 31-10-10, numbers congregated in the grass lands at dusk; all appearances point to a migration; Bipuria, 7-11-10, about seventy estimated in one party in grass lands hereabouts.

From the above records it appears this Bee-eater gradually recedes from the forest regions to the open grass country in the plains towards the cold season as I have no dates available for the terai for November and onwards until their arrival the following year in June or July. Undoubtedly nests in North Lakhimpur specimens procured in July lack the elongate middle pair of tail-feathers and are birds of the year.

271. *Melittophagus swinhoi* (Hume.) [1030].—The Chestnut-headed Bee-eater.

Evidently a migrant and locally distributed, occurs in North Lakhimpur generally in pairs, never abundant, records noted at commencement and termination of rainy season.

Khakoi R., North Lakhimpur, 21-3-05, ♀; Dejoo, about 20-4-03*; Dejoo (Hinni, Jan.), 3-6-10*, a day or so before burst of monsoon; 27-6-08*, a pair in forest (Rajghur); 14-9-08*, a pair; 17-10-04, ♂.

272. *Nyctiorhis athertoni* (Jard. and Selby.) [1031].—The Blue-bearded Bee-eater.

Resident along the tract of country at the base of the foot hills. Rare in the plains. Rungagora, 18-11-01, single record; Margherita, December, January, February, March; Dejoo, January, July, 29-8-08, a Bee-eater which had hung around my bungalow, close to a *jan* or stream to-day was hawking for food within a few feet of my window taking repose in a small tree close at hand, familiar to a degree. Dejoo R. higher reaches, (Daphla hills low elevations), 18-12-04, ♂.

273. *Ceryle rudis leucomelanura*, Reichenb. [1033].—The Indian Pied Kingfisher.

Ceryle varia, Blanford, F. B. I., Vol. iii., p. 119.

This Pied Kingfisher is a familiar object on all the rivers in the plains.

Many such a little episode as the following may be seen any day preparatory to the nesting period, frequently at such times three birds may be seen in company, probably two males vying for a female. Rungagora, R. Dibru, 12-1-02. To-day I was a witness of some evolutions of a pair of Kingfishers. A seated bird perched on a reed parallel to the water

was subjected to repeated buffetings by another bird which made incessant oblique darts through the air. First on one side and then from the opposite side, coming as near to the stationary bird as possible, causing the latter to reverse its position with each change of direction of its assailant: the exuberance of its spirits was manifest with a rapid flapping of its wings although no noise was audible with the exception of the usual sharp pipe.

274. *Ceryle lugubris guttulata*, Stejn. [1034].—The Himalayan Pied Kingfisher.

Ceryle lugubris, Blanford, F. B. I., Vol. iii., p. 121.

Confined to the rivers around the head of the valley, occurs at low elevations to the limit of the fast flowing water as it enters the plains. Very wary and difficult to procure; each pair of birds if more than one pair haunt the same river have their allotted beat.

Joyhing R., Dejoo R., Panchnoi R., Kola Pani; Dholong R., Khakoi R., Runganuddie and Subansiri in North Lakhimpur.

275. *Alcedo ispida bengalensis*, Gm. [1035].—The Indian Common Kingfisher.

Alcedo ispida, Blanford, F. B. I., Vol. iii., p. 122.

Generally distributed throughout the plains, occurs along the banks of forest rivers and streams, although more plentiful in the more open parts of country. A large series secured in the vicinity of Komolabari, Sibsagar, can be picked out at a glance from specimens from the forest tracts by their pale coloration.

276. *Alcedo beavani beavani*, Wald. [1036].—Beavan's Kingfisher.

Plentifully distributed throughout the plains.

Eggs taken 19-6-04 at Dejoo.

277. *Alcedo grandis*, Blyth. [1038].—Blyth's Kingfisher.

Occurs in North Lakhimpur at the foot of the hills in the gullies and deeply shaded fast flowing streams, restricted to a very few miles beat.

Panchnoi, Daphla hills (low elevations), 22-11-05, ♂, 23-11-05, ♂, 24-11-05, ♀; Dejoo R., 11-12-04, ♂, ♂; 1-1-05, ♂; Khakoi, R., 21-3-05, ♂, strangely enough only one female secured.

It has an arrowy flight and in consequence is very difficult to procure on the wing and when at rest settles in the dense vegetation well out of observation. Iris brown; bill black, red at gape, lower mandible in female palehorny orange-red; tarsus pale coral red; claws reddish-horny, middle claw darkest.

278. *Ceyx tridactyla* (Pall.) [1040].—The Indian Three-toed Kingfisher.

Rare in the plains. One seen Paropara Jan., R. Dibru, cold season 1902.

Dinjan, 28-4-01, ♂, killed against tea house window. In North Lakhimpur is more in evidence at the commencement of the rainy season and onwards. Apparently somewhat migratory as no cold season records are available.

Dejoo, April and May 1910, noted on numerous occasions as it flashed past uttering its sharp note; 9-5-07, nest in "teelah" a few feet from ground level in dense forest; 10-5-07, another nesting site inside hollow tree stump in same forest

Dejoo, several specimens procured, June (11-6-04, ♀), July and August (6-8-04, ♂); Silonibari, 27-4-11, ♂, 4-5-11, ♂, 22-5-11, ♂.

279. *Rhamphalcyon gurlal* (Pearson) sub. sp. ? (1043).—The Brown-headed Stork-billed Kingfisher.

Pelargopsis gurlal, Blanford, F. B. I., Vol. iii, p. 129.

NOTES ON THE BIRDS OF UPPER ASSAM.

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Generally distributed throughout the plains on "bhils" or forest streams "jans", R. Dangari, Digiltarung, Gurrung Jan, Rungagora; Bhimpooa bhil, Gogaldhubie.

Dejoo (In North Lakhimpur plentiful), Komolabari.

280. *Halcyon smyrnensis fusca* (Bodd.) [1044].—The White-breasted Kingfisher.

Halcyon smyrnensis, Blanford, F. B. I., Vol. iii., p. 132.

Plentifully distributed throughout the plains.

281. *Halcyon pileata* (Bodd.) [1045].—The Black-capped Kingfisher.

Dejoo, North Lakhimpur, 7-4-04. Recorded, Journal, B. N. H. Socy., Vol. xvi., p. 154. It has not occurred since. As this Kingfisher occurs in Upper Burma, the inference to be drawn is that its appearance ought to take place more frequently than it actually has done as it appears to be addicted at performing sporadic movements.

282. *Halcyon coromanda coromanda* (Lath.) [1046].—The Ruddy Kingfisher.
Callialcyon lilacina, Blanford, F. B. I., Vol. iii., p. 134.

Sparingly distributed throughout the plains.

Rungagora, 7-8-02, a specimen brought in alive which had been caught in the Dinjan tea-house; several captures of Kingfishers reported to me from the same quarter and under similar conditions.

Dejoo (base of hills), North Lakhimpur. Forest clearance, 10-6-07, ♂, one of a pair which had a nest containing young about fifty feet above the ground in a huge Poma tree (*Chickrasia tabularis*). At the time I was not aware that this was a breeding bird as the remaining bird was unable to repel the buffetings of some Paroquets, *Palæornis fasciatus*; the nest was eventually deserted owing to these miscreants dislodging the young birds.

283. *Dichoceros bicornis* (L.) [1051].—The Great Hornbill.

Occurs throughout the plains, more plentiful at the foot hills, a denizen of lofty forest trees and in consequence difficult to secure. The noise made by these birds is daily produced in an almost exact representation by the "paniwallah" as he returns with his tins of water balanced on his "sangra" to the cook house, an operation which has misled me to believe these Hornbills were passing overhead on not a few occasions, 26-2-09*.

Dejoo to Silonibari forest, fourteen *D. bicornis* in two relays, ten in front and four behind, making for the forest.

Dejoo, 22-4-08*, this morning I came suddenly on three pairs in some huge trees adjacent to the seed nurseries, they bounded up and along the thick branches with rapid though ungainly hops, some were within gunshot before taking flight.

♂. Iris crimson-red; bill: upper mandible gamboge yellow merging towards tip into orange-red; lower mandible pale horny yellow merging towards tip into yellow; upper surface of casque orange-red; basal half of culmen and front black; base of lower mandible black; orbital skin and tarsus dark olive; claws horny. ♀. Iris pearly white.

284. *Anthracoceros albirostris affinis* (Hutton) [1053, part].—The Large Pied Hornbill.

Anthracoceros albirostris, Blanford, F. B. I., Vol. iii., p. 145.

The Common Hornbill of the plains. Occasionally seen on the ground in forest, disturbed several of a small party partaking of the over ripe berries that had fallen. Drepai, 26-1-06.

♂. Iris reddish-brown; tarsus greenish-plumbeous.

285. *Rhytidoceros undulatus undulatus* (Shaw.) [1054].—The Malayan Wreathed Hornbill.

Very uncommon in the plains at all events around Rungagora, though I have seen odd single birds in the forest between the Dibru and the Bramapootra in the cold season.

Dejoo, North Lakhimpur, 30-3-10, at this time numerous pairs crossing and recrossing the garden at early morning and most noticeable generally.

Silonibari, June 1911, not a day passes without some seen overhead, singles, pairs and small parties. Silonibari, 6-8-11, to-day whilst observing one of these hornbills pass overhead I was struck by the absence of noise which is invariably accompanied with their laboured flight. It was raining at the time with a very dense atmosphere. Would this fact not be accounted for by the damp state of the bird's plumage, the feathers of the under wing coverts deadening the noise? They generally keep well out of gunshot range, it sometimes happens that they cross at a lower altitude than usual, if they see any person in their course they strike out in another direction as soon as they realise there may be danger as I have witnessed. Not much in evidence in the cold season, possibly sedentary. Specimens secured around Dejoo, June, July, August, September (juvenis). ♂. Iris reddish-brown; orbital skin reddish-purple; gular skin chrome-yellow; bill pale greenish-horny, at base purplish red; tarsus greenish black; claws black; transverse band across gular skin black.

286. *Ptilolamemus austeni* (Jerdon) [1060].—Godwin-Austen's Hornbill.

Confined to the forest around Margherita, probably best treated as a sub-species of *tickelli*. The generic names in general use for the Hornbills have been retained but are in need of revision.

287. *Upupa epops saturata*, Lönnerberg. [1066.]

Upupa epops, Blanford, F. B. I., Vol. iii.

Irregular cold season migrant, numerous records for cold season months, the following dates constitute the earliest arrivals and latest departures:—

Dejoo, 2-9-10*, not in evidence some days later probably due to an unexpected spell of hot weather. Rungagora, 17-9-01, ♂*♀, female only secured, a pair observed a few days previously although date not recorded at the time.

Silonibari, 16-9-11, ♂ ♀*; on the 23-9-11 at 5:30 a.m., there were five Hoopoes in company under the window of my room unconcernedly foraging in the sandy soil of the compound with evident success.

Dejoo, 19-9-08*; Rungara, 25-4-01; Joyhing, 24-4-10*; Dejoo, 12-4-10*; Rungagora, 8-4-02, ♂ ♀?*, 8-5-02*; Silonibari, 24-4-11, ♂ ♀*; a pair observed on 17-4-11, possibly same birds. One bird caught and released 20-4-11, its feathers sodden with rain.

288. *Upupa epops indica*, Reich. [1067].—The Indian Hoopoe.

Upupa indica, Blanford, F. B. I., Vol. iii., p. 161.

Reported occurrence of a Hoopoe during "the rains" had often been mentioned, but no specimens forthcoming, it was only on the arrival of this visitor that I was able to satisfy myself a resident bird did occur; the secured specimen settling this point without doubt.

Silonibari, North Lakhimpur, 6-8-11, ♂, first seen on 30-7-11; 30-9-11*, there was a fine adult under my bungalow window this morning in company with a bird of the typical form: the latter seemed to be the master of the situation to its annoyance; it was on one of these occasions when I had the opportunity of seeing its crest expanded, there was the decided richer tone of the rusty colour compared with *U. epops saturata*, the white wing bars also exhibited a more pronounced rufous tinge. A dirty wet day previous and heavy rain last night.

289. *Apus affinis affinis*, Gray. [1073].—The Common Indian Swift.

Cypselus affinis, Blanford, F. B. I., Vol. iii., p. 168.

Specimens collected. Joyhing, 12-2-05, ♂, ♂, agree with East Nepal birds. Length of wing, 5.4" and 5.2", outer retrices .2 longer than middle pair and are referable more to the typical form, trusting to these measurements than to *A. a. subfurcatus*. Some records of Large Swifts seen as follows may have been *A. pacifus*. Rungagora, 1-6-02, single bird hawking for insects at evening over the Dibru R. in company with Sand Martins. I noticed a peculiar flapping of the wings on flight and the marked difference between the length of primaries and secondaries. It passed repeatedly within a few feet of my head and constantly was dipping into the water.

Dejoo, common, July and August. Rajghur, 27-8-10, numbers hawking within gunshot range, bright morning, heavy rain clouds over the hills.

Dejoo, 19-4-07*; Silonibari, 2-9-11.* Two large Swifts flying fairly high during heavy rain, low temperature, several seen also on 25-9-11*.

290. *Tachornis batassiensis batassiensis* (Gray) [1075].—The Palm Swift.

Rungagora, 16-1-02*, 9-4-03, ♂; Dejoo, 1-1-05, ♀, 2-4-7-04, 3 ♂.

These Swifts attach their nests to the large overhanging leaves of the Toko Palm (*Livistona jenkinsiana*) in compounds, very frequently almost within hand reach. Other favourite positions are the projecting eaves of the thatched roofs of the bungalows. The Rungagora bungalow was in much request in this respect. At evening they sally out in quest of food with lively twitterings and arrowy flight.

291. *Collocalia unicolor fuciphaga* (Thunb.) [1082].—The Himalayan Swiftlet.

Collocalia brevirostris, Blanford, F. B. I., Vol. iii., p. 177.

Dejoo, North Lakhimpur, 4-3-10, several procured during a dull afternoon, numbers were hawking for food at high and low altitudes.

292. *Caprimulgus macrourus ambiguus*, Hart. [1093, part].

Caprimulgus macrurus, Blanford, F. B. I., Vol. iii., p. 188.

Rungagora, 8-11-01, 3 ♀ ♀; Dejoo, 21-7-07, ♂; 12-9-08, ♂; 24-6-10, ♀ juv.; 5-11-08, ♂, shot at 12-30 p.m. midnight in the centre of the clean trodden path which had its alignment past my bungalow at full moon, almost as daylight.

Rungagora, September 1902, one night during this month whilst near Kamptigwali on my walk home from Dinjan a nightjar alighted on one of the fence posts, on the high road allowing me to approach within two arms' lengths before taking flight. Quite a common occurrence to have them flying about the bungalow compound after sunset. I have seen them dash under the verandah porch, very frequently alight a few paces in front of one on the path and as one strolls along flap leisurely to another position a few paces farther away, again to be disturbed and act in a similar manner.

293. *Caprimulgus indicus indicus*, Latham. [1095].—The Jungle Nightjar.

Dejoo, 12-2-05, ♂, single record only.

Lyncornis cerviniceps possibly has been overlooked. I have a note against this Nightjar. First weeks in September, Dejoo, North Lakhimpur; but as no specimens were secured this record lacks substantiation.

294. *Batrachostomus hodgsoni hodgsoni* (G. R. Gray) [1097].—Hodgson's

Frogmouth.

Dejoo, North Lakhimpur, 1-1-05, ♀. This bird was brought in alive from the hills by Daphlas.

Iris pale stone; bill brownish-pink, tip dark; tarsus similar coloured to bill; claws dark. Stomach contained small coleoptera sp.? remains.

295. *Harpactes erythrocephalus* (Gould) [1101].—The Red-headed Trogon. Resident: Extremely plentiful in the plains in forest tracts.

Margherita, January, February, March, December; Rungagora, December, January, March; Dejoo, July, August; Beni, Abor-Miri hills, February.

296. *Cuculus canorus telephonus*, Heine. [1104, part].—The Eastern Common Cuckoo.

Cuculus canorus, Blanford, F. B. I., Vol. iii., p. 205.

Personally I have never heard this bird call in North Lakhimpur although undoubtedly authentic reports of rare occurrence however have reached me. The following records refer to immature birds which strange to say have been much more in evidence in my experience than adults. Dejoo, 9-04, ♂; 5-9-08 ♂, 30-8-08, 15-9-04, ♂, ♀; 23-10-04, ♀; Rungagora, 14-4-01, adult, 8-10-03, juv.; Silonibari, 8-5-11*, 15-8-11*, adult single; 8-9-11*, single immature at close quarters attracted my attention whilst it demolished some larva.

297. *Cuculus micropterus micropterus* Gould. [1107].—The Indian Cuckoo.

Dejoo, North Lakhimpur, 30-7-08, ♂, juv.; 10-4-10*, first time heard calling this year at west corner of garden; Silonibari, 10-4-11, first time heard calling this year. They continued to call up to 16-5-11 again, heard on the following dates:—20, 22 and 29-5-11, latter date in morning, 25-6-11, 13-7-11, and 23-8-11, these two last dates must be unusually late.

In North Lakhimpur announces its arrival in April with its melodious call, towards the end of June there is a lull and the bird is not much in evidence, silent more or less at egg laying time, seldom seen as it has a decided preference for the thick scrub growth on the forest outskirts.

298. *Cuculus sparveroides*, Vig. [1108].—The Large Hawk-Cuckoo.

Hierococcyx sparveroides, Blanford, F. B. I., Vol. iii., p. 211.

Occasionally occurs throughout the plains and sparingly at the foot of the hills in North Lakhimpur.

Dinjan, Dibrugarh, 4-1-02, ♂; Panitola, Dejoo, 17-9-07, ♀; Dejoo, 3-3-09*, partial to thick secondary growth, chiefly feeds on larvæ and grubs. ♂ ad. Iris dark yellow; bill greenish-horny, upper mandible dark; gape and orbits light yellow; tarsus bright yellow; claws light horny. ♀ juv. Iris pale stone brown; orbits greenish; gape yellow; bill, upper mandible dusky black, lower mandible greenish-yellow; tarsus dark ochreous yellow.

299. *Cuculus fugax nasicolor*, Blyth, [1110].—Hodgson's Hawk-Cuckoo.

Hierococcyx nasicolor, Blanford, F. B. I., Vol. iii., p. 214.

One record only. Dejoo, North Lakhimpur, 16-6-04, ♀, probably overlooked.

300. *Cacomantis merulinus querulus*, Heine. [1113].—The Rufus-bellied Cuckoo.

Cacomantis merulinus, Blanford, F. B. I., Vol. iii., p. 218.

Dhoolohat, North Lakhimpur, 20-3-09*; Dejoo, 23-2-11*, calling after rain; 26-3-10*, uttering the first two or three notes incessantly both throughout the day and at night; a day or so elapsed before its full vocal powers were attained; rain previously.

Nalkatta Rd., North Lakhimpur, 2-4-10, 10-30 p.m., several whistling at full pitch, but one only able to emit hoarse notes at each endeavour; 9-4-10*, I heard evidently this same bird in the identical quarter on the following Saturday, very little perfected in its call.

Rungagora, 11-4-03, ♂, 2-8-03, ♂ juv., 27-10-03, ♂ juv., 24-1-02*, at roadside.

Dejoo, 15-4-07, ♂ ad., 17-4-07, ♂ ad., 21-4-07, ♂, ♀ juv., 27-5-07, ♂ ad., 28-11-10, ♀, 26-8-10*, corner tree close by bungalow, as silent nowadays as it is noisy at the mating season.

Dejoo, 24-11-08, on this unusual date I heard the first few notes of this Cuckoo at early morn and located an adult bird in the Fish-Tail Palm (*Caryota urens*, L.) at the entrance to the compound.

Evidently resident. Only occasionally calls at the beginning of July, equally at home during a dry moonlight night, the drenching downpours of the blackest night or midday, heat nothing seems to damp its ardour as it pours forth its monotonous notes, which fall in the scale with the precision of tonic solfa modulations.

♂ adult. Iris venetian red; sometimes with a whitish outer ring; orbital skin yellowish-dusky or lobster red; gape and inside mouth salmon red or lobster red; bill blackish-dusky horn, base of lower mandible reddish; tarsus yellowish-ochreous; claws horny black. ♀ immature. Iris dull brown; bill dark horny with a blotch of dusky on lower mandible; tarsus dull yellow; claws black horny.

301. *Penthoceryx sonneratii* (Lath.) [1114].—The Banded Bay Cuckoo.

Dejoo, North Lakhimpur, a series secured as follows:—27-8-08, ♂ ad.; 20-8-08, ad.; 26-8-08, ♀; 13-9-07, ♀ juv. ♀ juv.; 6-9-08, ad. observed; 21-8-08, adult.

Dejoo, 1908, this Cuckoo has somehow replaced *C. merulinus* this season, numerous young birds in immature dress in evidence, whereas last season the former bird was the most plentiful. No further data to report. I fail to account for this most unusual appearance, making due allowance for the bird having been overlooked although a look out was kept in future years no more evidence came to hand.

302. *Chrysococcyx maculatus* (Gm.) [1116].—The Violet Cuckoo.

Dejoo, North Lakhimpur, first secured, 4-6-04, ♂; 20-4-07, two pairs, one male secured; 26-7-07, ♀*, in Poma tree near Rungagora lines.

Silonibari, 17-9-11, ♀*, which I failed to secure, its rosy head first attracted my notice, also its method of feeding, evidently occupied demolishing a larva or some grub.

♂, 4-6-04. Iris red-brown; orbital skin red; bill orange yellow at base and gape red, tip dusky; tarsi olivaceous purple.

♂, 20-4-07. Iris red brown; orbital skin and gape waxy red; bill yellow, tip dusky; tarsi olive green, stomach contained remains of Coleoptera sp.? These Cuckoos kept up a sweet twittering in the overhanging trees along trolley line and were exceedingly tame.

303. *Surniculus lugubris dicruroides* (Horsf.) [1117].—Drongo Cuckoo
Surniculus lugubris, Blanford, F. B. I., Vol. iii., p. 223.

Dejoo, North Lakhimpur, 20-4-03, ♂, secured in dense evergreen forest foot of hills, almost impenetrable undergrowth.

Dejoo, 15-4-07, ♂; 16-6-04, ♀ ♀; 26-3-10, noted for the first time calling this year, heard again a few days later; Bipuria, 10-4-11, in some numbers along the road to North Lakhimpur.

Silonibari, 17-9-11, still in evidence, I shot one of a pair although failed to secure it as a mass of creepers a great height up the trunk of the tree prevented it falling to the ground, silent at this time of the year. Its call resembles the syllables whistled as "phew" "phew" "phuit" in an ascending scale.

Iris brown; bill black; tarsus plumbeous; soles similar pale plumbeous.

304. *Coccyzus jacobinus* (Bodd.) [1118].—The Pied-crested Cuckoo.

Dejoo, North Lakhimpur, 25-9-10, a single immature bird in change of plumage, secured in some low-lying ground. Failed to meet with it before or since this date.

305. *Coccyzus coromandus* (L.) [1119].—The Red-winged Crested Cuckoo.

Rungagora, 15-10-03, ♀; Dejoo, Rajghur, 20-4-07, pair.*

As a rule keeps to the dense undergrowth, in consequence seldom seen and difficult to arrive at its true status in the district.

306. *Eudynamis orientalis honoratus* (L.) (1120).—The Indian Koel.

Eudynamis honoratus, Blanford, F. B. I., Vol. iii., p. 228.

Migratory in Upper Assam, evidently resident in Bengal as noisy anyway in this latter province in January as it is on arrival in Assam and during the later rainy months, possibly on migration extends up to the head of the valley in the plains before spreading out towards the hills as my dates around Dibrugarh denote earlier arrivals than in North Lakhimpur although fifty odd miles farther up the valley.

Polasbari, Bengal, 25-3-09, calling; Goalundo, Bengal, 17-1-11, calling; Rungagora, 30-3-03*, first arrivals, 4-4-02*; Silonibari, 10-4-11*, calling; North Lakhimpur (station), 16-4-10*.

Dejoo, 9-5-07, first heard this year; 26-5-05, ♂; Komolabari, 1—13-9-04, ♀; Dejoo, 14-9-08, a young Koel flew overhead followed by some crows, *C. splendens* and settled in a tree behind the bungalow to which the crows came on and fed it; the Koel making a feeble attempt at cawing.

307. *Rhopodytes tristis tristis* (Less.) [1123].—The Large Green-billed Malkoha.

Resident throughout the plains, particularly plentiful at the base of the hills. Generally found in thick secondary growth, although several of my specimens have been obtained at some heights from the ground, but in these cases the heavy creepers and parasitic growths on the trees gave the birds the incentive to forage for food, they hop on and about the creepers with occasional flicks of their long graceful tails.

Rungagora, November, December, March; Dejoo, January, March, June, specimens secured these months. Iris brown; orbital skin and cere dirty crimson; bill light emerald green; tarsus plumbeous green; claws dark horny.

308. *Centropus sinensis sinensis* (Steph.) [1130].—The Common Coucal.

Common throughout the plains. A denizen of scrub and secondary growth.

309. *Centropus bengalensis* (Gm.) [1133].—The Lesser Coucal.

Throughout the plains. In North Lakhimpur possibly more plentiful than *C. sinensis* under the hills where it frequents similar haunts although in the plains this is essentially a grass land coucal as noted around Rungagora.

310. *Palæornis torquatus* (Bodd.) [1138].—The Rose-ringed Paroquet.

Plentifully distributed throughout the plains. Immense flocks of Paroquets darken the air at times during the cold weather when on the wing. Their arrowy flight and harsh chattering call is familiar to the most unobservant. Their presence however when at rest unless located on the naked branches of decayed trees is by no means easy to detect as the green plumage assimilates with the dense foliage of the evergreen forest.

311. *Palæornis cyanocephalus rosa* (Bodd.) [1140].—The Eastern Blossom-headed Paroquet.

Palæornis rosa, Blanford, F. B. I., Vol. iii., p. 252.

Plentiful in North Lakhimpur at base of the hills.

Specimens collected during June, July, August, evidently resident.

312. *Palæornis schisticeps finschi*, Hume. [1142].—The Burmese Slaty-headed Paroquet.

Palæornis finschi, Blanford, F. B. I., Vol. iii., p. 254.

Occurs around the north-eastern corner of the Valley, Margherita, and extends into the plains as far as Panitola. (Chota Tingrai, Tinsukia.) 14-2-04, ♀.

313. *Palæornis fasciatus* (J. L. S. Müller). [1145].—Red-breasted Paroquet. Commonly distributed throughout the plains.

314. *Loriculus vernalis vernalis* (Sparrm.) [1150].—The Indian Loriquet.

A single ♀, 3-6-04, secured some few miles south of Dejo, North Lakhimpur, and a pair seen on the Bodutti Rd. near the station of North Lakhimpur in the cold weather 1906, constitutes the total available evidence.

♀. Iris pale naples yellow, bill and cere orange yellow; upper mandible reddish-orange; tarsus orange; claws horny.

315. *Phodilus badia badia* (Horsf.) [1154].—The Bay Owl.

Photodilus badius, Blanford, F. B. I., Vol. iii., p. 268.

Occurs sparingly in the plains. Dibrugarh, 19-11-04, ♂, two records for North Lakhimpur only; Pathalipam, Dejo, 17-11-08, ♂.

316. *Asio flammeus flammeus* (Pontoppidan.) [1157].—The Short-eared Owl.

Asio accipitrinus, Blanford, F. B. I., Vol. iii., p. 271.

Hessamara (Subansiri churs), 31-12-05, ♂, secured in bright sunlight about 10 a. m. after having been flushed several times from the scanty scattered clumps of grass growing hereabouts on the sandy "churs". Until this specimen was actually in my hand I took it for *Tyto (Strix) candida* which undoubtedly occurs in Upper Assam though I have failed to secure it through lack of opportunity to work the grass lands more thoroughly and to the best advantage.

317. *Strix indrani newarensis*, Hodgs. [1160].—The Himalayan Brown Wood-Owl.

Syrnium indrani, Blanford, F. B. I., Vol. iii., p. 275.

Silonibari, latter days in April 1911, a youngster was taken out of a huge hollow tree which was felled at the forest clearance. A rigorous search failed to locate another. The adult parents were seen several times afterwards in the vicinity of their home. This bird was kept alive and in December had almost assumed the adult plumage noted at the time as a gradual change, not by a month as in *Huhua nepalensis*. The dark irides and its large size misled me into thinking that the specimen was no other than *H. nepalensis*. This fact combined with the dangerous policy of taking things for granted might have ended this interesting record as the bird in the careless hands of others died during my absence and the skin was not preserved; it was only when I was in camp on the Nepal frontier that I secured a young *Huhua nepalensis*, that the thought immediately crossed my mind that the former bird was no other than *S. indrani newarensis*; as this Owl keeps to the almost impenetrable virgin evergreen forests at the base of the hills in North Lakhimpur it is small wonder it had escaped my notice for such a long period.

318. *Ketupa zeylonensis zeylonensis* (Gm.) [1164].—The Brown Fish-Owl.

Plentiful in all well-watered localities, nocturnal, yet in the dense forest tracts interspersed with sluggish streams "jans" emerging from the "bhils"

may be seen at day time roosting in the dense foliage on the alert, Gurrung Jan, R. Dibru, 26-1-02*. R. Dibru, cold season 1903, sex ? Panitola, 17-3-02, ♂; Silonibari, 24-4-10, ♀. *Ketupa flavipes* may occur in the hill rivers; this Owl is the largest of the genus, in colour a rich tawny, until actual specimens have been secured. It is impossible to say definitely. *K. zeylonensis* reaches the base of the hills in North Lakhimpur at all events. Fish Owls observed April 1907. R. Dejoo*, Subansiri Gorge, January 1905,* possibly were *K. flavipes*.

319. *Ketupa ketupa* (Horsf.) [1166].—The Malay Fish-Owl.

Ketupa javanensis, Blanford, F. B. I., Vol. iii., p. 283.

Common in the forest streams which emerge into the Dibru.

Rungagora, 16-3-02, ♂. Cold season 1903 sex. ? 31-1-04, ♀; Dejoo, North Lakhimpur, 5-3-11, ♀. A Malay species, in all probability generally distributed throughout the plains in Upper Assam. Iris bright gamboge yellow; cere light green; bill bluish-horn dark on culmen; tarsus bluish-fleshy; claws dark horny.

320. *Huhoa nipalensis* (Hodgs.) [1170].—The Forest Eagle-Owl.

An adult procured at Derpai in broad daylight after it had made an attack on some fowls, by Mr. Lindsay Alexander, September 1907.

16-4-08, a solitary breast feather picked up in new clearance, Rajghur, Dejoo.

14-10-07*, whilst coming through a "Putti" forest track on my return from Silonibari to Dejoo on the high land, one of these Eagle Owls allowed the elephant to approach right underneath the branch of a tall tree on which it was resting affording a truly impressive sight of this large handsome Owl. This would be about 4 p.m. in good light. It was in no hurry to take flight either and winged its way on doing so very leisurely; the dark irides were very prominent. As this Owl has a similar habitat to *Syrnium indrani newarensis* it is a most difficult matter to obtain specimens and as it cannot be numerous if indeed it is not actually rare very little information is forthcoming of its status in the district.

321. *Otus spilocephalus* (Blyth.) [1175].—The Spotted Himalayan Scops Owl.

Scops spilocephalus, Blanford, F. B. I., Vol. iii., p. 295.

Occurs on both sides of the valley at the foot hills.

Margherita, January, February, March; Dejoo, February, March.

Joyhing, 9-2-09, a shot specimen received in flesh in an emaciated condition covered with parasites. A previous example found dead in the Gorge of the Runganuddie, some distance farther up than this specimen seems to show the prevalence of some disease amongst these owls.

Iris pale yellow; bill and tarsus dull horny pink.

322. *Otus bakkamæna lettia* (Hodgs.) [1178].—The Himalayan Collared Scops Owl.

Scops bakkamæna, Blanford, F. B. I., Vol. iii., p. 297.

Rungagora, 18-2-02, ♀; Margherita, 17-1-03, ♀.

The status of *O. giu* and this species is very imperfectly known owing to insufficient data. Occurs. On the plains, failed to get any specimens in North Lakhimpur where *O. spilocephalus* is the prevalent form. One record, Dejoo, 24-11-07*, lacks substantiation. The Scops Owls have a preference for the verandah railings of one's bungalow much to the consternation of the servants who regard their visit as unlucky and their presence as an ill omen.

323. *Athene brama brama* (Temm.) [1180].—The Spotted Owlet.

Confined to the more open tracts of country. Specimens secured at

Maijan near Dibrugarh, April 1901, records from no other localities. Possibly overlooked, although my own personal impression is that Upper Assam is the extreme limit of its range in one direction.

324. *Glaucidium cuculoides cuculoides* (Vig.) [1183].—The Large Barred Owllet.

Commonly distributed throughout the whole area.

Margherita, December, January, February; Rungagora, December, March, August; Dejoo, January, August, juv. Its habit of perching in exposed positions and its flights in broad daylight sometimes leads to its destruction by large accipitrine foragers.

325. *Glaucidium brodiei brodiei* (Burton) [1186].—The Collared Pigmy Owl.

Occurs in the plains though not plentiful. Panitola, Hessamara, 25-2-08,* along roadside roosting in the reeds at mid-day; 8-1-06, ♀, Margherita, February, March.

326. *Ninox scutulata burmanica*, Hume. [1187, part].—The Burmese Brown Hawk Owl.

Ninox scutulata, Blanford, F. B. I., Vol. iii., p. 309.

Generally distributed throughout the plains, invariably found in forest in the vicinity of water. Gurrung, Jan., R. Dibru, 21-1-02, ♂; R. Dibru, Digiltarung, cold season 1903, ♂; 26-1-02, ♀; Dejoo, 27-8-08, ♂ Juv.

327. *Pandion haliaëtus haliaëtus* (L.) [1189].—The Osprey.

R. Dibru, 5 miles below Rungagora, 9-3-02, ♂. The river at this locality forms eddies of fast flowing water, an unusual trait for this sluggish river and was choked with snags.

Gogaldhubie, Bhimpooora bhil, 15-1-05, ♀; Hessamara, Subansiri, 8-1-06, ♂; Nagaghoolie, Dibrugarh, cold season 1901, a pair had taken up their quarters in a bhil near at hand, and appeared quite at home on a forest covered patch of land in the centre of the bhil. It only required a slight stretch of the imagination to bring to one's memory their island homes on Loch Arkaig and Loch an Eilean and picture the similarity. Dejoo, 19-9-08*, flying high; Joyhing, Runganuddie, 4-6-10,* rather an unusual date, a single Osprey passed overhead as I crossed the river, taking a swerve when right over head; Dejoo, 10-10-10*, I noted an Osprey hovering over a small jan in the garden this morning, it was possibly intending to settle with a view to demolish a fish that it held in its talons, the arrival of a king vulture (*Otogyps calvus*) resulted in its hurried departure when it gave utterance to some squealing notes. It was quickly lost to view as it made off in the direction of the Runganuddie.

328. *Otogyps calvus* (Scop.) [1191].—The Black Vulture.

Generally distributed in the plains although only odd birds and pairs mixed up with the common vultures are usually seen at work demolishing decaying carcasses.

Rungagora, 5-3-02. Iris pale yellow ochre; tarsi pinkish-yellow.

329. *Gyps tenuirostris*, Hodgs. [1195].—The Himalayan Long-billed Vulture.

The common vulture in the plains. These vultures often choose at Dejoo some Fish-tail Palms (*Caryota urens*, L.) to congregate after a heavy gorgé. As these trees stand at the entrance to the compound, one has to give them a wide berth as the droppings come down in small showers.

330. *Pseudogyps benalensis* (Gmel.) [1196].—The Indian White-backed Vulture.

Occurs in North Lakhimpur fairly frequently; one secured at Dejo, 21-8-05, ♀. It requires no slight exercise of one's will power even if blessed with a strong stomach to tackle the preservation of any vulture, in particular if the thermometer is registering a high reading. The amount of persuasion exercised and baksheesh promised for native assistance makes it also a thankless task and some time has to elapse before the skin is presentable for the cabinet.

331. *Ictinaëtus malayensis*, (Reinw). [1210].—The Black Eagle.

Occurs at all events in the lower ranges of the hills on the north frontier, but unknown even at the base of the hills or in the plains. A pair observed beating over a bare ridge in the vicinity of Beni, Abor-Miri country in February 1906 during a particular wet and cold month. In the Sikkim hills it is about the least shy of all the larger accipitrine birds and is by no means restricted to forest as it may often be noted leisurely foraging over the sparsely wooded gullies and cultivated slopes, almost invariably in pairs.

332. *Spizaëtus nipalensis* (Hodgs.) [1213].—Hodgson's Hawk-Eagle.

Chota Tingrai, Tinsukia (Plains), 15-2-04*, Dejo, North Lakhimpur (base of hills), left bank Runganuddie, 30-11-08, ♂; Silonibari, North Lakhimpur, 7-6-11.* Both in morning and in the afternoon I had a good view of this fine Eagle; breast feathers heavily blotched. A pair of crows (*C. macrorhynchus*) kept it in close attendance to its evident annoyance.

These records constitute the whole data available. It also occurs around Margherita. Dr. Falkner had a live specimen at Panitola for several years obtained when a youngster from this latter locality.

333. *Spilornis cheela rutherfordi*, Swinh. [1217].—The Burmese Crested Serpent-Eagle.

Spilornis cheela, Blanford, F. B. I., Vol. iii., p. 357.

Common throughout the plains, a familiar object of bird life in the landscape, not confined to any particular class of country excepting deep forest, appears almost oblivious to its surroundings when seated on a tree stump or naked branches of an isolated tree.

Rungagora, 9-3-02, ♀, in very pale, almost white plumage; R. Dibru, Rungagora, 16-3-03, ♂, in normal dark plumage; North Lakhimpur, 8-8-04, ♀, in normal dark plumage; Derpai, 16-3-06, ♀, in normal dark plumage; Dejo, 14-8-08, ♂, throat pure white; breast white faintly streaked with dark centre lines; abdomen pale; crown and nape white, each feather with a dark bar. Dejo, 2-10-08, ♂, in normal dark plumage; 11-08 sex? very pale plumage; breast white almost devoid of markings; crown, nape and throat white streaked in places.

Dejo, 31-8-08, ♂; 18-9-08, ♀, 2-10-08, ♀; 15-10-08, ♂; 31-10-08, ♀; all in normal dark plumage.

334. *Butastur teesa* (Franklin)? [1220].—The White-eyed Buzzard-Eagle.

These two records undoubtedly refer to a Buzzard-Eagle as no specimens have been secured: the species cannot be determined beyond all doubt. I have been mistaken on many occasions in being led to believe immature specimens of *Haliaëtus indus* were *Butastur* sp. until the bird was actually in my hand.

Dejo, 8-10-10*, 12-5-08*, similar to a Kestrel in its movements though more laboured, eventually soared up to a great altitude and was lost to view.

335. *Haliaëtus leucorhynchos* (Pall.) [1223].—Pallas's Fishing-Eagle.

The common Eagle on the banks of all the large rivers, the Bramapootra in particular and on various large sheets of water "bhils" throughout the

plains. Birds in all stages of plumage make it somewhat difficult to discriminate though the white band across the middle of the tail is a sure means of identification in adult plumage. On several occasions seen to attempt to seize Duck and other water birds.

336. *Polioaëtus ichthyaëtus* (Horsf.) [1226].—The Large Grey-headed Fishing Eagle.

Generally distributed throughout the plains in all well-watered localities. Joyhing, Runganuddie; Dejo, Runganuddie, 15-8-08, ♀; 16-9-08, ♂; Gogaldhubie, Bhimpooa bhil, 8-12-05, ♂; 16-12-05, ♂; Komolabari, Bramapootra; Rungagora, R. Dibru, 29-12-01, ♀; 14-2-04, ♀. Immature birds are liable to be confused with the previous species until actually in the hand for comparison.

337. *Polioaëtus humilis major*, Meyr and Wigl. [1227].—Fishing Eagle.

Polioaëtus humilis, Blanford, F. B. I., Vol. iii., p. 371.

By no means as plentiful as *P. ichthyaëtus*, occurs on the Dibru. Rungagora, 28-11-03, ♀.

338. *Haliastur indus indus* (Bodd.) [1228].—The Brahminy Kite.

Unequally distributed in the plains. In some localities rarely seen and only at certain periods, partial to haunts in the vicinity of water.

Bhimpooa bhil, Gogaldhubie, 8-12-05, ♀ (512); 19-12-05, ♀ (511); 20-12-05, ♂ (4547); Hessamara, 10-4-05, ♂ (513); North Lakhimpur, 15-6-04, ♀ (455); Dejo, 15-9-08, ♀ (833); 31-10-08, ♂ (468); 11-08 sex ? (408); 13-11-08, ♀ (3290).

No. 455. First plumage. Iris dark hazel; bill bluish-black; tarsi dull olive yellow; claws black.

No. 833. First plumage. Iris pale brown; tarsi greenish-yellow; claws black.

Nos. 408 and 511. Immature plumage second stage. These specimens on the back in places show the ruddy tinge of the adult; head and breast uniform pale sandy red with faint centre stripes.

No. 513. Adult. Iris stone brown; bill green and bluish-horny; cere yellow; orbital skin and gape greenish-yellow; tarsi dull yellow; claws black. A great relief to the Miris of the "gaon" adjacent to which this bird had taken up its site was its dispatch and heralded with much shouting as it had taken a heavy toll of their fowls.

339. *Milvus melanotis*, Temm. and Schleg. [1230].—The Large Indian Kite.

Commonly distributed throughout the plains, apparently replaces *M. govinda* in Upper Assam.

Dejo, April 1903, a small party located in the bamboos, heavy rain at this time; Rungagora, 8-12-03, ♀; 10-12-03, ♀; 15-12-03, ♀; Gogaldhubie, 7-12-05, ♀; North Lakhimpur, 21-11-05, ♂; Dejo, 25-9-08, ♀; 14-9-08*, a pair in the vicinity of bungalow first appearance this cold season; 23-9-10 I noted three this afternoon; they appeared to have come up the valley with the advent of heavy rain; the next morning were in evidence roosting in a large tree about a hundred yards from bungalow; Silonibari, 9-9-11* and on 11-10-11,* four to six birds seen.

At times during the rains they have been reported to congregate in vast numbers although I have no personal observations on this point. I have seen them probing for earth worms in parties of six to eight individuals on cleared ground after rain. All the above records are cold season data, apparently absent at other periods of the year.

340. *Elanus caeruleus* (Desf.) [1232].—The Black-winged Kite.

Komolabari, Sibsagar, 1-13-9-04, ♂; Hessamara, Subansiri, 9-4-05, ♀; 28-12-05, ♀; 29-12-05, ♂.

Sissi to Bordeobam, North Lakhimpur, 24-2-08*, noted on two occasions in "pothar" and grass lands.

Dejoo, 25-6-08*, an immature bird; breast tinged with fulvous. Again seen on 27-6-08* which possibly was the same bird.

North Lakhimpur, 9-1-09*, in flight over polo ground.

Pohumara, North Lakhimpur, 11-11-10*, three to four miles south on Bodutti road hovering gracefully over "pothar" land. Its efforts at hovering may not be as perfect or sustained as the Kestrel, yet this Kite is a most interesting and beautiful addition to the landscape.

Silonibari, 11-4-11*, a pair; 6-5-11*, 19-8-11*, a splendid bird preening its feathers whilst perched on a stake in a portion of the garden allowed me to approach within a very few yards; there was a strong breeze blowing and as it rose it soared up to a considerable elevation; the sun threw its white tail feathers into prominence a fine sight heightened by the atmospheric conditions; the heavy black clouds which enveloped the hills gave warning of the close proximity of a thunderstorm. Silonibari, 8-9-11*, a single bird probably immature.

This Kite is essentially restricted to the vast expanses of grass along the sandy banks of the rivers. The above notes of its occurrence at various times at the base of the hills are therefore of interest.

341. *Circus macrourus* (Gm.) [1233].—The Pale Harrier.

Circus macrurus, Blanford, F. B. I., Vol. iii., p. 381.

Dejoo, North Lakhimpur, 14-2-09, ♀; 23-4-07, ♀*; 27-4-08, ♀*; 3-4-5-10, ♀*.

These three records in April and May probably refer to this Harrier, if not, certainly *C. cyaneus*, as no specimens were secured it is impossible to say to what species they refer with absolute certainty as identification of these Harriers on the wing is a difficult matter.

Colouration of soft parts in female. Iris deep brown; cere greenish; bill blue black; tarsus pale yellow; claws bluish-black.

342. *Circus cyaneus* (L.) [1235].—The Hen-Harrier.

Dejoo, 15-9-08, ♀*; 26-10-08, ♀*; 13-11-10, ♀*; 9-1-09, ♀*; Rungagora, Dibrugarh, 24-1-04, ♀; 26-1-04, ♂; Dejoo, 14-11-09, ♀; Pathalipam, North Lakhimpur, 2-3-09, ♂; Kamptigwali, Dibrugarh, 7-3-04, ♂; Dejoo, 7-3-09, ♀; North Lakhimpur, station limits, 16-4-10, ♀*; Rungagora, Dibrugarh, 23-4-02, ♀*; Silonibari, 29-4-11, ♀*; Dejoo, North Lakhimpur, 26-10-08. I came across a female at work dispatching the remains of a Hoopoe on my rounds this morning.

Dejoo, 7-2-09. I noted two females beating the ground in a most systematic manner, almost impossible for anything to escape as they had both taken their positions at different heights, the one following also in the wake of the other.

Dejoo, 9-2-09, Hen Harriers, females at all events are to be seen hovering over the tea and also occasionally engaging in bouts of combat as next day I noted two with another hawk careering in hot pursuit after each other.

Colouration of soft parts in adult male: Iris golden yellow; in immature male, iris pale yellow; cere bluish-yellow; bill dark horn; tarsus dull yellow ochreous; claws black. In one adult female, iris bright yellow; cere and eyelids similar; bill horny black; gape greenish-yellow; tarsus orange yellow; claws black. Another adult female: iris stone brown; cere greenish; bill blue black; tarsus deep yellow; claws bluish-black, and a female also has the iris light stone brown; cere and orbital ring yellow with a green tinge; tarsus pale yellow ochre.

The advent of these Harriers: the adult males in their pure white and grey plumage with a rapid graceful flight as they beat the ground in search of food is a charming sight and as true harbingers of the eagerly desired cold weather are always welcome. The presence of these marauders is duly announced by Bulbuls and Mynahs who create a general commotion and quickly betake themselves to any light jungle affording a retreat when they survey the flight of their dreaded enemy from the tops should they pass at a safe distance. A near approach and they drop into the inner denser foliage. There appears to be no lack of food to supply their wants judging by the numbers which visit the plains during the cold season. Hoopoes fall an easy prey and pay a heavy toll in consequence.

Dejoo, North Lakhimpur, 15-2-09, Harriers evidently have certain chosen spots when disposing of their captures. I noted this day the red feathers of the male Minivet (*Pericrocotus brevirostris*), tail feathers of Bulbuls (*Otocompsa emeria*), (*Molpastes bengalensis*) and Trogon (*Harpactes erythrocephalus*) at one such place. *Circus cyanens* is apparently the common species. There is no reason why *C. pygargus* (L.), Montagu's Harrier, should not occur although I have failed to get any specimens.

343. *Circus melanoleucus* (Forst.) [1236].—The Pied Harrier.

Bodutti, North Lakhimpur, 13-1-11, ♂*, passed me at a remarkably close range, so intent was it quattering the ground in search of food. North Lakhimpur, station limits, 20-3-09, ♂*, beating over the Polo Ground. Harmutty, North Lakhimpur (base of hills), 22-3-09, ♂*.

North Lakhimpur, station limits, 7-4-08, ♂*, frequenting the open ground by the cutcherry.

Dejoo, North Lakhimpur, 20-7-08, ♂*, passed overhead flying in the direction of Harmutty over the heavy forest at the base of the hills, quite out of its usual habitat.

Silonibari, 31-7-11, ♀*, a beautiful adult manœuvring at the top end of the garden identified by its small size and dark plumage. A dirty afternoon, a heavy shower fell shortly afterwards.

Dejoo, 24-9-10, ♂*, undoubtedly on arrival from higher elevations, morning very wet, north wind blowing, observed beating over the garden.

Silonibari, 3-10-11, ♀*; presumably this species seen again 9-10-11.

Dejoo, 11-10-10, ♀*, very dark bird, 25-11-07, ♂*; 25-12-10, ♂*.

More addicted to wide open expanses of grass lands, although it may be seen beating over damp marshy ground, seldom seen in the forest tracts at the base of the hills. The above records are thus deemed worthy of note. Resident: yet it can only be regarded thus in a partial manner as it is undoubtedly most plentiful in the cold weather months.

344. *Circus aeruginosus* (L.) [1237].—The Marsh Harrier.

Bhimpoora bhil, Gogaldhubie.

7-12-05, ♂, crown and throat rufous with a few dark streaks; man somewhat light, other rest of plumage dark brown. Wing 16.25".

9-12-05, ♂, crown rufous with dark markings; mantle and breast rufous mixed with dark blotchings. Wing 16".

Iris stone brown; cere bluish-yellow; bill horny black; tarsus dingy yellow; claws black.

20-12-05, ♂, crown rufous with a few light streaks; throat and breast white mixed with heavy brown blotchings, mantle somewhat rufous. Wing 17.75".

6-12-05, ♀, crown dull yellowish-white feathers abraded; throat similar; breast somewhat rufous otherwise in dark plumage; mantle slightly blotched rufous. Wing 17".

Iris dark brown; cere pale yellowish; bill black horn, bluish at base; tarsus dirty yellow; claws black.

8-12-05, ♀, crown rufous streaked; throat rufous; upper breast some light blotches otherwise in dark plumage. Wing 16.5".

12-12-05, ♀, crown and nape dull yellowish-white feather abraded; throat similar; breast blotched with brown and white, remainder of plumage dark. Wing 16". The sexes are practically identical in size. Locally distributed owing to its propensity for well watered tracts. A common bird in some of the large "bhils" in North Lakhimpur.

345. *Buteo ferox* (S. G. Gmel.) [1239].—The Long-legged Buzzard.

Dejoo, North Lakhimpur, molested by two Jungle Crows and driven out of the trees near the Tea house jan, at the time put down as *Pernis cristatus*. Secured on 29-11-10 and proved to be a ♂. Wing 16.5", length 21". Iris warm stone grey; cere greenish-yellow; gape yellow; bill black, bluish towards base; tarsus olivaceous yellow; claws black. This specimen is remarkably pale but agrees with a similar example from Afghanistan in my collection. This locality is considerably east of its range as given by Blanford. (Sikkim).

346. *Accipiter badius poliopsis* (Hume.) [1244, part].—The Burmese Shikra.
Astur badius, Blanford, F. B. I., Vol. iii., p. 398.

Rungagora, 4-7-03, ♂ ad. (149); Komolabari, 1-13-9-04, ♂ ad. (135).
Dejoo, 23-7-04, ♂ juv. (140); 2-3-5-10 *, 2-8-04, ♀ juv. (141); 5-8-04, ♂ juv. (139); 15-9-08, ♀ ad. (828); 10-8-07, ♂ juv. (151); 21-10-08, ♀ ad. (827).

No. 149. Shot with a Sparrow (*Passer montanus*) in its talons which it had taken out of a tree a few yards from the bungalow at mid-day.

This series shows all the characteristics in plumage from the immature stage to adult. ♂ ad., No. 140, iris crimson; ♂ immature, No. 151, iris pale yellow.

347. *Lophospizias trivirgatus rufitinctus* (McClell.) [1246, part].—The Large Crested Goshawk.

Lophospizias trivirgatus, Blanford, F. B. I., Vol. iii., p. 401.

Rungagora, 29-12-01, ♂ juv. (195), very pale specimen, sparsely blotched on breast; Dejoo, 25-4-03, ♂ ad. (159), iris golden-yellow; 24-7-04, ♂ juv. (198); 12-9-08, ♂ juv. (201); 8-1-11, ♂ ad. (3541); Derpai, 27-1-06, ♂ ad. (156).

No. 195. Iris light yellow; cere and orbital ring yellow; bill: lower mandible blue black, upper mandible black; tarsus dull yellow; claws blackish-horn.

No. 156. Iris orange; cere and gape greenish yellow; orbital skin yellow; bill black; tarsi dark yellow; claws black.

No. 3541. Iris deep gamboge; cere greenish-yellow; orbital skin and gape greenish-yellow; bill bluish at tip, base black, lower mandible pale bluish; tarsus ochreous yellow; claws black.

This series shows all the characteristics in plumage from the immature stage to adult. Somewhat unusual that no females have been secured.

Beni, Abor-Miri hills, 5-2-06, as we were about to pitch our camp in some forest adjacent to the "changs" we disturbed this hawk in possession of a partridge *Arboricola rufigularis* which it had almost picked bare and dropped at our approach.

348. *Accipiter nisus nisosimilis* (Tickell) [1247, part].

Accipiter nisus, Blanford, F. B. I., Vol. iii., p. 402.

Rungagora, Dibrugarh, 6-4-03, ♂, No. 137, immature in abraded plumage; 26-1-04, ♂, No. 136, immature; 28-2-04, ♂, No. 4548, immature; Dejoo, North Lakhimpur, 2-12-10, ♂, No. 3473, adult.

As all these specimens were of a very pale phase in plumage and suspected of being referable to some eastern form, I submitted this small series along with a supposed *A. nisus melanoschistus* from the Nepal-Sikkim Frontier to Dr. Hartert who kindly promised me a report on them when dealing with the Sparrow Hawks for his "Palæarctic Birds." Under cover of a letter, 17-2-14, while stating that the latter bird is undoubtedly *melanoschistus*. No. 3473 belongs to the race "*nisosimilis*." The adults of these two forms are very distinct but it is not always possible to distinguish the young birds only *melanoschistus* would occur in the summer while *nisosimilis* would be by far the commoner bird in winter. I am of the opinion that both the young males from Rungagora, Dibrugarh, are "*A. n. nisosimilis* and not *melanoschistus*."

NOTE.—No. 3473. Wing 8.5", iris gamboge yellow; cere greenish-yellow; bill horny black, at base blue; tarsus deep ochreous yellow; claws black.

This Sparrow Hawk had its quarters in the vicinity of the bungalow and was shot with a sparrow in its talons which it had taken out from the verandah at evening.

No females secured, *Accipiter affinis*, Gurney, and possibly other eastern forms as *Accipiter virgatus confusus*, Hart., may occur. No specimens of these two Sparrow Hawks have however been obtained.

349. *Accipiter gularis* (Temm. and Schleg.) [1248, part.]—Sparrow-Hawk, Rungagora, Dibrugarh, 7-4-01, ♂, No. 134, in adult plumage; iris golden yellow; cere pale lemon yellow; bill leaden grey, black at tip; tarsus yellow.

Dr. Hartert identified this specimen as this species. Blanford makes *gularis* a synonym of *virgatus*. Hartert treats it for the present as a good species though it might be a sub-species of *A. virgatus* but not of *A. affinis*.

350. *Pernis cristatus ellioti*, Jerdon. [1249].—Crested Honey-Buzzard.

Pernis cristatus, Blanford, F. B. I., Vol. iii., p. 406.

Rungagora, 15-4-01 ♀ (19), Mokalbari (Dibrugarh), Dejoo, 12-4-08, ♂ (16); 15-8-08, ♀ (18); 2-10-08, ♀ (17).

No. 19. Iris golden yellow; bill blackish-horn; gape and base of lower mandible bluish tinge; tarsus dull yellow.

Nape and head extremely light and rufous; the breast suffused with a ruddy tinge especially the under tail coverts, striæ almost obsolete except on upper breast. Wing 17".

No. 16. Iris red brown; bill, dark horn upper mandible, bluish-dark horn lower mandible; tarsus dull yellow ochreous; claws dark, stomach and gape contained remains of insects, flies and honeycomb, wing 15.5", very dark plumage; upper breast without any white markings.

No. 17. Wing 16". Breast and abdomen crossed with white markings and heavily blotched.

No. 18. Iris golden yellow in somewhat similar plumage to No. 16, though somewhat abraded and white markings more in evidence. This bird had hung about in the vicinity of the Factory buildings for some days previously, it had been shot at on the Saturday previously, heavy forest a few miles away, yet these Buzzards seem very partial to the vicinity of habitations.

Dejoo, 12-10-07,* a pair beating over the grass lands in Rungagora, portion of garden.

Dhoolohat-Silonibari, 29-1-10,* a fine adult bird at rest in tree on road side.

Dejoo, 3-5-10,* a single bird beating over the Rajghur, cold, wet day.
11-10-10,* a single noted.

Silonibari, 14-6-11, one flew overhead into the "Bansbari" on the Dhoolohat road.

Equally distributed throughout the plains. The above data exhausts all the available evidence as to its status.

351. *Baza lophotes* (Temm.) [1251].—The Black-crested Baza.

Rungagora, 25-8-02, forest path beyond Wattijan in the direction of Digiltarung. I had a splendid view of three of these Bazas as they passed overhead from and to the trees on each side of the track. I again saw them on a future occasion some distance in the forest. This record refers to the only locality where these beautiful birds have come under my notice.

352. *Baza jerdoni* (Blyth.) [1252].—Blyth's Baza.

Dejoo (Rajgur forest), North Lakhimpur, 15-9-07, ♀.

Total length 17.7"; wing 12"; tail 8.5"; bill 1.2"; tarsus 1.5".

Iris pale golden yellow; cere and base of lower mandible pale bluish; bill horny black; gape dull bluish; tarsus china white; claws dark blackish-horny; stomach contained remains of vivid green insects, Mantids, Blattids, Coleoptera sp.? and a large green larva of a Sphingid sp.? Insect remains were found in gullet also.

This specimen agrees fairly closely with the description of immature birds in Blanford, otherwise the median gular stripe is present and a white bar on the tail below the coverts.

Dejoo, 2-2-09*, observed a pair of accipitrive birds in recently felled forest clearance, their flight was an alternate rapid beating of the wings and then a gliding movement in a direct line with motionless outstretched wings. In size about *Lophospizias trivirgatus* but showing a patch of white on the rump or upper tail coverts, they eventually settled on some high trees surrounding the clearance. I have every reason to believe these birds to be this species.

Silonibari, 8-6-11, bright sunny morning, an accipitrive bird soaring in circles with an occasional rapid beating of the wings, white patch on rump, very prominent; the locality was in heavy forest, seen from a clearance as the bird made these movements over the tops of the trees.

353. *Falco peregrinus calidus*, Lath [1254, part].—?

Falco peregrinus, Blanford, F.B.I., Vol. iii., p. 413.

Peregrines have been seen on several occasions at Rangagora and Lilabari in particular, it was quite impossible to identify them on the wing owing to their rapid flight. A single bird seen at rest on the branch of a huge tree at the foot of the hills at Dejoo on 4-5-08 was no doubt referable to the true Peregrine and also a pair of birds which had their headquarters in a Poma tree (*Chickrasia tabularis*) at the ghant Dejoo in the cold weather of 1904-5; these birds used to sally out over the river at morning, but failed to put in an appearance the next cold season: one seen crossing the polo ground, North Lakhimpur, 9-1-09.

Falco peregrinator Sundev. Probably occurs, until specimens are actually secured, no satisfactory solution is possible of its existence.

354. *Falco severus* Horst. [1261].—The Indian Hobby.

Derpai, North Lakhimpur, 13-1-06, ♀ ad. (177); 15-1-08, ♀ immature (826); 6-8-08, ♂ immature (825).

Other records from Derpai, Panitola, Rungagora where these Falcons used to frequent some lofty trees adjacent to the Post Office.

Dejoo, 16-12-04*, a pair noted in high tree in Rajghur; 3-9-08*, a rather light coloured specimen; 5-9-08*, a single bird hawking at evening over the Factory buildings; 13-8-08*, observed in clearance located on a tree the

Peregrine was wont to frequent; 27-10-08*, a male passed overhead low down but travelling at a great speed; 30-10-08, this evening I saw a Hobby snatch up a small bat when on the wing and as it flew around took repeated digs with its beak at it whilst held in its talons, after some time had elapsed it took its departure with every indication of finishing its repast at leisure.

Dejoo, 12-2-09*, a pair frequenting the naked branches of the lofty trees surrounding the nurseries, completely secure out of gun shot range.

Dhoolohat, 4-6-11*, at evening a single bird dashed past the bungalow. These records constitute the sum total of occurrences.

355. *Falco vespertinus amurensis*, Radde. [1262].—The Eastern Red-legged Falcon.

Erythropus amurensis, Blanford, F.B.I., Vol. iii., p. 424.

Dejoo, North Lakhimpur, 27-10-08, four of these lovely Falcons seen hawking around the lofty trees surrounding the nurseries on the Rajghur, eventually settled on the naked branches of a high tree when three of them afforded me a truly grand view as they were busily engaged preening their feathers in the bright sunlight. Next day they had disappeared. This Falcon noted on 3-5-10, Dejoo, soaring over Rungagora portion of garden cold wet day, certainly not. *F. severus* but as the specimen was not secured this record is uncertain.

356. *Falco tinnunculus tinnunculus* L. [1265].—The Common Kestrel.

Dejoo, 25-9-08*, hovering over a portion of garden, dull and windy afternoon; 26-9-07*, first appearance noted this cold weather; 27-9-10*, a pair hovering afforded a particularly fine sight; Silonibari, 8-10-11*, another observation recorded for 10-10-11, possibly the same bird or pair of birds; Dejoo, 18-10-10*, hawking with Rollers this evening for food; ♂ ♀, 1-11-08; ♂ ♂, 21-11-05; ♂, 14-12-04; Rungagora, Dibrugarh (Plains), ♀, 30-1-04.

Dinjan, Dibrugarh, ♀, 7-4-01; Silonibari, 11-4-11*, a pair observed; Dejoo, ♂, 7-4-03, 19-4-10*; located in a small tree from which it was sallying out in search of food, a bright morning, 25-4-10*; Silonibari, 27—29-4-11, a single bird which had its quarters hereabouts, I noted it settle on the tea; Dejoo, 3-5-10*, hovering over a portion of the garden, a miserable day, cold and wet with harsh wind coming in gusts from the north; 5-5-10*, a single bird observed in another locality from that of the previous record although it might have been the same bird; 9-5-07*, two pairs still about.

Silonibari, 28-7-11*; Dejoo, 2-8-08*, noted as a most unusual occurrence; 27-8-10*, circling over a portion of the garden about 3-30, hot afternoon.

357. *Falco tinnunculus saturatus* (Blyth)? [1265, part].—The Indian Kestrel.

Falco tinnunculus, Blanford, F. B. I., Vol. iii., p. 428.

The last three records above almost certainly point to the resident bird, *Falco tinnunculus saturatus*, Blyth, but as no specimens have been secured from May to October it is only conjecture though the above July and August dates are significant.

All my specimens evidently are the typical form.

I have to thank Dr. Hartert for checking my identification of the above series of secured specimens.

358. *Microhierax melanoleucus* (Blyth.) [1268].—The White-legged Falconet.

Resident: Occurs frequently around Margherita and occasionally in North Lakhimpur.

Joyhing, 12-9-05*, whilst driving past some coolie lines, perched on a

small tree adjacent to the road side a beautiful male Falconet was occupied demolishing the remains of a Sparrow. Never in all my experience did I ever recollect such a case of absolute fearlessness as it was perched only a few feet above my head, even the first attempt to procure it by a youth with his bow and arrow failed to dislodge it and it was only at a second fruitless attempt that it flew off with a sharp shriek and dropped its quarry.

Sabati, Nov. 1905*, a single noted in the bare branches of a tree at garden edge.

Joyhing, 16-4-07*, one flew overhead at evening near the Doctor's bungalow.

Dejoo, 15-2-09*, a pair reported to me by an intelligent native Sirdar as having been seen in the forest jungle surrounding the nurseries.

Silonibari, 13-9-11*, whilst at the woodstack this afternoon I noted numbers of swallows busily engaged hawking for food around the stack. When there was a sudden dart in amongst their numbers, on turning round I noted one of these Falconets carrying away a swallow to an adjacent bare tree stump about fifteen yards from the trolley line, as the top of its quarters could only be about twenty feet from the ground and it was quite unconcerned.

I had an excellent opportunity of studying its methods as it commenced by digging its bill into the head of its victim occasionally preening its own feathers and giving itself a slight shake as it was drizzling rain at the time.

(To be continued.)

PROGRESS OF THE MAMMAL SURVEY.

As was announced in the last number of the Journal, three of the Society's Collectors have left the Survey and gone home to the War. The remaining Collector, Mr. C. A. Crump, alone carries on the work of the Survey and is at present collecting in Sikkim, where he had just gone when the last report was written. He has been working round Gangtok but reported Mammal life to be scarce there, though he was able to secure good series of voles and mouse hares. After collecting round Gangtok he worked north to Chuntang on the Lachen road finding animals much more plentiful and, which is most encouraging, he is securing help from the natives. Between the 10th and 13th December, over 40 specimens of some 16 kinds were collected or brought in. The Sikkim collection will be of very great importance and help in determining, along with that from Kumaon, the numerous species described by Brian Hodgson, many of which are only known by the old and faded types in the British Museum.

We would appeal to members all over the country to assist in keeping the Survey going till the War is over and we can, if possible, get our other collectors back. Much valuable work can be done by sending in specimens from districts already collected in, which were not recorded in the report dealing with that district and a list of which can be sent to anyone. Also by sending in any skins (measured in the case of animals up the size of a hare) with skulls from districts not yet worked. From certain districts topotypes (*i.e.*, specimens collected in the locality where the original type or specimen from which the first description was taken, came from) are very much wanted and a full list of these can be had from the Honorary Secretary. The following may be mentioned as examples of some of the topotypes wanted:—Indian Wolf and Indian Fox from the Deccan, the Sind Hare from Sukkur, the Desert Fox from Rajputana and Salt Range, Jungle Cat from Mussoorie, the Common Mongoose from Kashmir, Leopard Cat from Lower Bengal, Phayre's Leaf Monkey from Arrakan, Horsfield's Flying Squirrels from Rangoon.

For some time the Common Indian Hare has been much wanted from Lower Bengal to enable many of the hares, obtained in the various collections to be properly worked out. Our Collector, Mr. Crump, when in Calcutta in the rains made a short excursion to obtain specimens but was unsuccessful and as he had to go to Sikkim was unable to try again. Now, however, through the kindness of Mr. Laird-MacGregor we have received a specimen of the common hare from near Calcutta, where the specimen from which the original description was made came from. With the help of this specimen various common hares obtained by the Survey will be able to be properly worked out. A series of specimens from Lower Bengal is still however much to be desired.

REVIEW.

THE MACROLEPIDOPTERA OF THE WORLD.

EDITED BY

DR. A. SEITZ.

VOL. I.—PALEARCTIC RHOPALOCERA. VOL. IX.—INDO-AUSTRALIAN RHOPALOCERA (PART) LONDON, WILLIAMS AND NORWICH, 1908-1913.

In 1906 Dr. Adalbert Seitz of Frankfurt commenced the heroic task of publishing a comprehensive work on the macrolepidoptera of the world in collaboration with the best known entomologists. His aims were conciseness, a low price, as far as possible a figure of every form and finally rapidity of publication.

The work is divided into two main divisions, *viz.*, Fauna Palearctica and Exotica. Fauna Exotica is further sub-divided into three sections, *viz.*, Fauna Americana, Indo-Australica and Africana. Division I and each section of Division II are each being issued in four volumes, *viz.*, *Rhopalocera*, *Sphingidae* and *Bombycidae*, *Noctuidae*, *Geometridae*. A volume on morphology, etc., is to follow. Thus the work will be completed in 17 volumes, each 13" x 10". It is being issued in parts, each part ordinarily containing 8 pages of letterpress and 2 plates; the price per part of Division I is one shilling and of Division II one and six pence. It is stated that Division I and each section of Division II will each contain 100 parts, but this estimate is likely to be exceeded. Students of the macrolepidoptera of India will require the whole of the Fauna Palearctica (Div. I) and section II, Fauna Indo-Australica of Div. II.

Volume I, *Rhopalocera Palearctica*, was commenced in October 1906 and completed in January 1910 in 47 parts. It contains 380 pages of text and 89 plates. The authors are Dr. Seitz for *Papilio*, *Danainae*, most of the *Satyrinae*, *Argininae*, *Melitae*, *Nemeobidae* and *Lycenidae*; H. Stichel for *Parnassius*, *Morphidae* and most of the *Nymphalidae*; J. Rober for the *Pieridae*; G. Eiflinger for *Erebidae*; and P. Mabille for the *Hesperiidae*.

Of Volume IX., *Rhopalocera Indo-Australica*, the first number appeared in May 1908, but the second did not follow until two years later. Since then publication has been rapid; 88 parts containing 704 pages of letterpress and 139 plates have been published dealing with the *Papilionidae*, *Pieridae*, *Danainae*, *Satyrinae*, *Morphinae* and most of the *Nymphalidae*. Except for the *Papilio*, which have been written up by Dr. K. Jordan, the remainder of the work has been dealt with by H. Fruhstorfer.

The "Macrolepidoptera of the World" does not profess to be an exhaustive treatise, but a concise book of reference for all the named species and races and, with the aid of the plates, it affords a rapid means of identification. The general arrangement does not differ from what we are all used to. The race system is, however, elaborated; this is a more rational treatment than that adopted by Moore, Swinhoe, etc., and its further elaboration may be looked for in the future. For ready reference the name of the genus is given at the top of every page and the names of the various species, races, etc., in the margin. Concise descriptions are given of the families, genera, species, etc., and of the earlier stages, were known, the idea being that with so many figures long detailed descriptions are unnecessary. One could have wished for more detail, but this would of course have increased the size of the work. There are no long lists of

references, a familiar feature in most books on insects, nor is much attention paid to synonymy. There is an excellent index at the end of each volume and after each family a list of species, etc., with a reference to the original description. The plates also aim at conciseness and do not profess to be artistically arranged; the figures are placed as close together as possible, in most instances half the upper and half the underside being depicted; at the head of each plate is given the name of the genus dealt with and under each figure the name of the form represented. The figures are excellent and compare most favourably with those to be found in the most expensive works on natural history. Owing to the rapidity of publication several errors have crept in, but these are corrected from time to time. The work is being published in German and translated into English and French; the English translation might perhaps have been better done, as in some cases the meaning is rather obscure.

Mabille's treatment of the Palearctic *Hesperiidae* by means of keys to the species in each genus is admirable; one could have wished that the same method had been adopted for such difficult genera as *Lycæna*, *Erebia*, *Argynnis*, *Melitæa* and *Parnassius*. Jordan's section on the Indo-Australian Papilios is excellent and brings up to date Rothschild and Jordan's monograph on the Papilios of the old world.

Fruhstorfer has split up many of our Indian species into races. Though no doubt he is justified in this course, yet it would have been more convincing, if he had mentioned the extent of the material on which he had based his deductions; in some cases it would almost appear as if he had not even seen the form to which he has assigned a name. He describes the genitalia of many species and has used this feature to some extent as a basis for classification; by this means he has cleared up several doubtful points, which have always puzzled entomologists.

It may safely be said that the aims of the author have been fully attained. Having regard to the conditions set forth it is difficult to say how the work could be improved on; its price is most reasonable and within the means of nearly every collector. We wish it the success that it deserves.

VOL. II.—PALEARCTIC BOMBYCES AND SPHINGES. VOL. X.—INDO-AUSTRALIAN BOMBYCES AND SPHINGES. VOL. XI.—INDO-AUSTRALIAN NOCTUIFORM PHALÆNÆ.

Of these volumes only part of Volumes X and XI have been received, but Vol. II is complete in itself both as regards text and plates. This latter volume comprises the Palearctic Bombyces and Sphinges, of which the former are defined as "all the Heterocera which do not belong to the Sphinges Noctuids, Geometrids and Micros," so that it is perhaps unfortunate that the first family described here called the *Zyganidae* should really belong to the Microlepidoptera, and the same criticism will apply to the *Psychidae*, *Cossidae* (which should be the twenty-sixth family cited, and not the twenty-fifth, as stated) and the *Egeriidae*. The term "Bombyces," as indicating any natural group of moths, is obsolete and only reminiscent of the worst traditions of the nineteenth century, and the sooner its use is abandoned, the better. In the present case, for example, the *Zyganidae* are placed in close proximity to the *Syntomidae*, with which they have nothing in common except a slight superficial resemblance; to the expert such a method of arrangement matters little, but the amateur is likely to conclude that proximity in arrangement indicates real affinity, an idea which he will have to unlearn later and perhaps with difficulty.

The sections on separate families are written by various authors and are followed by an alphabetical list of species with references to the original

description of each one. As is inevitable under such a system, the sections are unequal in value, some (such as those on *Zygaenidae* and *Sphingidae* by Dr. Karl Jordan) being very well written and others hardly of the same quality. Dr. Seitz himself deals with the *Syntomidae*, "*Arctiidae*," *Notodontidae*, *Megalopygidae*, *Limacodidae*, *Heterogynidae* and *Cossidae*. He is perhaps an expert on Butterflies but we may be pardoned for suggesting that his views regarding Moths must not always be taken too seriously. His ideas of the limits of the *Arctiidae*, for example, seem very hazy and will doubtless undergo revision after further study. The student of Indian Moths will note that *Pecynola longirostris* (here placed in the *Nolinae*) is really a *Meridarchis* and belongs to the *Carposinidae* (*Tortricina*). The *Hypsinae* are here given as a sub-family of the *Arctiidae*, but it is unfortunate that the only species included should be *Eligma narcissus*, which is really a Noctuid, whilst *Argina* and *Nyctemera*, which are really *Hypsidae*, are relegated to the "*Micraetiinae*" and *Nyctemerinae* respectively. The name *Micraetia* is here published, by the way, as a new generic term, and various new generic and specific names are brought forward in this and other volumes of the work under review; we do not consider that a popular book of this nature is the proper place for the publication of such names.

Dr. Seitz's ideas regarding the limits of species are generous to say the least. He appears to suppose (Vol. II., p. 73) that *Utetheisa pulchelloides* is merely a form of *pulehella*, although it is structurally quite distinct. In Vol. X. also Dr. Jordan unites various species of *Heterosia* (e.g., *magnifica*, *virescens* and *cingala*) which cannot be regarded as conspecific in the usual sense of the word "species."

Misprints are unavoidable in a book of this nature, but they are usually obvious. A curious word, however, is "chrysalisses," Vol. II., p. 375, line 5, from bottom), evidently intended for "chrysalides," though this seems an unfortunate term to apply to *Algeriad* pupae.

Volumes X and XI, dealing respectively with the Indo-Australian "Bombyces and Sphinges" and Noctuidae are incomplete and the recent death of Mr. W. Warren, who was employed on Vol. XI., will probably delay the completion of the work, presuming that this survives the War at all.

This book is likely to be useful to the Lepidopterist in India, who is usually rather isolated from an adequate entomological library, provided that he realises that Dr. Seitz's volumes form only a preliminary introduction and provide in many cases merely indications of the affinities of the species which he wishes to identify. We do not wish to decry the book, which is excellent so far as it goes and distinctly good value for money. The coloured plates are good and provide recognizable figures of the normal forms of the insects depicted; but the amateur will thereby be apt to be misled into supposing that every specimen which he obtains can be determined by the figures given—a hopeless task in such genera as *Zygaena*, *Lithosia* and *Hepialus*.

These volumes should find a place on the entomological bookshelves of the numerous scientific institutions (e.g., Agricultural Colleges and Universities) which exist in India and will there be useful to those whose interests lie in the study of Moths.

Fauna Palaearctica, Vol. 1, 379 pages and 89 coloured plates, Royal 4 to, £3. Vol. 2, 480 pages and 56 coloured plates, £ 2-5-0, to be completed in 4 Volumes, not sold separately.

Fauna Indo-Australica to be completed in 155 parts at 1/6 per part n paper covers. Vol. 9, 10 and 11 in issue.

MISCELLANEOUS NOTES.

No. I.—VITALITY OF INDIAN WOLF (*CANIS PALLIPES*).

I shot a large male wolf as he was galloping past me and hit him in the abdomen, a little in front of the off stifle joint and blew out his intestines. On being hit the wolf stopped and snapped at and bit off all his remaining intestines except about 2 feet of the commencement which is attached to the stomach.

He then trotted off into a series of nullas for about 300 yards, but I turned him towards a big sandy nulla which he tried to cross to get into a patch of sugarcane. Some villagers turned him and he made several rushes at them open-mouthed while they were doing so. He then trotted down the nulla (my second shot missed him and the third shot cut the skin on the top of his head without in any way damaging the skull) got up on to some open land and again crossed the nulla, and when he reached the other side was brought down by a villager striking him across the back with a *lathi*. In all he travelled, after being hit, at least half a mile and probably would have gone very much further. I weighed him on arrival in camp and found (after losing all his intestines and a certain amount of blood) that he weighed 45 $\frac{3}{4}$ lbs.

As he was a large wolf his measurements may be of interest. Head and body 34.5", tail 13", ear 4.5", hindfoot 8.35".

The skin and skull (No. 3/1913) have been presented to the Mammal Survey.

HAZARIBAGH DISTRICT, 27th July 1914.

O. A. SMITH, MAJOR.

No. II.—EFFECT OF CASTRATION ON BLACK BUCK.

In a recent issue of the Journal I noticed an article on this subject which entirely agrees with my observations when in Peshawar in 1910. I was at the time attached to the Royal Warwickshire Regiment, who had a couple of fine Bucks as their regimental pets. One was rather a savage tempered brute and used to give considerable trouble on parade. When the question of improving his temper by the medium of castration cropped up, there was some demur on the subject, as the general opinion was that rather akin to the case of Samson's locks would be that of the Buck's fine black coat after the operation. However some ultra-flagrant act of violence towards his keepers settled his fate, and it was hoped that his fighting days were over. Now each year during the hot weather the bucks' coats used to change to a dull-brown and the beautiful glossy black did not re-appear till the cold weather.

But on this occasion the gelt buck's coat changed to a very beautiful fawn colour, and when winter came round it did not re-assume the fine distinctive colour of the normal buck. The above facts can be corroborated by any of the regiment who were in Peshawar at the time.

C. R. PITMAN,
27th Punjabis.

TANK, N. W. F. P., 17th September 1914.

No. III.—FURTHER NOTES ON WILD PIGS.

On 1st October 1914, I shot a boar near Nathua Maran. Viewed from behind it appeared to be absolutely destitute of hair either on the body or

on the crest; close examination however showed that its hair, including the crest, was not more than about 1 inch in length. This is very unusual, as I have seen a lot of wild pig both stuck and shot. The pig did not appear to be suffering from mange or any other disease. I wonder if any other member has ever come across a similar case?

Last April I shot a boar which was somewhat bare about the body, but had a lot of hair on its back and a very big crest. The animal first mentioned was about 5 years old and measured as follows: snout to base of tail (straight) 47", tail 12", height 28".

According to the natives of these parts there are two varieties of pig, which can be recognised both in the wild and the village pig: first variety is called Baseelwa, second variety Moonar. The differences are as follows:—Baseelwa have a very long skull with long snout and are thin and not broad. The Moonar has a short skull with a short suffly snout and is stouter and very broad. There are no differences in colour or height, but the pregnancy in the Baseelwas is said to last for six months, while that of the other variety is a month less.

I send this note as another member has brought to notice that two varieties are noted in his district and also because one of the wild pig skulls, (female), which I presented to the B. N. H. S. Mammal Survey was very elongated.

O. A. SMITH, MAJOR.

HAZARIBAGH DISTRICT, 10th October 1914.

No. IV.—NOTE ON A STRANDED GREAT INDIAN FIN WHALE
(*BALÆNOPTERA INDICA*) AT RATNAGIRI.

(With a Plate.)

A whale was washed ashore at Dhabool, 97 miles south of Bombay. It was first noticed on Wednesday morning, 11th December and I saw it on Saturday afternoon, the 14th. The Customs Karkun informed me that the animal was lying on its back stomach upwards, but when I first saw it the carcass had turned half over on to its side. It was only visible at low tide, being under water when the tide was in. I took the following measurements:—

Total length (tip of snout to tip of flukes)	..	41 ft.
Tip of snout to angle of mouth	..	9 ft.
Do. to blowholes	..	8'-7"
Length of flipper	..	4'-5"
Width of flipper at base	..	1'-7"
Eye to flipper	..	4'-5"
Base of tail to posterior end of dorsal fin	..	6'-8"
Dorsal fin height	..	2'-3"
" base	..	1'-2"
Flukes tip to tip	..	9 ft
Breadth from notch of flukes to angle with body	..	2'-0"

The animal was too far decomposed for any accurate idea of the actual colour to be obtained most of the epidermis having peeled off, but such as was left was slate grey in colour, while the flippers were very much darker almost black. The inside of the mouth was a dirty yellowish-white. The Karkun, who saw the animal when it was on lying on its back, said that the stomach was whitish, while he described the sides as greyish-black and the mouth parts pink.

The sides presented a fluted appearance with parallel lines running along the flanks beginning well behind the flippers and terminating close to the mouth. The animal was a male.

Great Indian Fin Whale (*Balenoptera indica*, Blyth) stranded at Vizianag.

MISCELLANEOUS NOTES.

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During my stay at Dhabool several hundreds of villagers, both from the coast and inland, came to see the animal. They regarded it as a god, calling it "Massa Dev," meaning fish-god. The local Fakir had established himself well to the windward of the carcass, several incense sticks were burning in front of it, more I think with a view to the gentleman's own comfort than in homage to the deity. A sheet was spread out in lieu of a collection bag and it was covered with copper coins and also offerings of rice and cocoanuts. I noticed that a great number of these people were Mahomedans. The prevailing idea among them was that treasure of considerable value could be got by cutting open the stomach of the animal. This was believed not only by the common folk but even by the Government clerks.

S. H. PRATER.

BOMBAY NATURAL HISTORY SOCIETY'S MUSEUM,
5th December 1914.

From time to time whales are stranded or washed up at no great distance from Bombay, and these are reported to the Society by the Customs officials, though so far we have not been successful in getting to the spot before the animal has become decomposed and lost its colour. The colour of our large Indian Fin Whale is still unknown, but perhaps some member situated on the coast may be fortunate enough to see a freshly stranded specimen and record notes on it. The specimen recorded above is apparently an immature great Indian Fin Whale (*Balaenoptera indica*) as this whale grows to 80 to 90 feet, according to Blanford. There is, however, at least one other species of *Balaenoptera*, which has been recorded from the Indian region, viz., *B. edeni*, but this is said to be a smaller species and is only recorded from the Bay of Bengal.

As was already reported in the Journal, Vol. XVII, a whale was washed ashore at Bassein, a little north of Bombay, in the spring of 1906, which was said to be 63 feet in length, but it was not reported to the Society till nearly a week after stranding. In January 1911 another was reported at Vizadrag, near Ratnagiri, and to examine this specimen Mr. Crump, who had just joined the Society as Mammal collector, was sent. On his arrival he found that nothing remained but the head and some of the larger bones; he was however able to secure some baleen. This whale was reported by the Customs Karkun there, to measure about 70 feet from nose to tip of tail in a straight line. Mr. Crump made a number of sketches and took measurements of the bones lying about.

In August 1912 a large Fin Whale was stranded at Ratnagiri, which was reported to be 61 feet in length. The colour above was said to be "dark grey in places almost black" and on the sides "lighter than on the top with well defined stripes below the flippers." The underside was "light grey in places almost white," while the tail and flippers were "almost black." A photograph of this whale was forwarded and is here reproduced.

Quite a number of whales seem to have been stranded about this time and the remains of several of them were washed up on the Ratnagiri coast.

Much valuable information in regard to the different species of Whales would have been secured if it had been possible to preserve some of the bones of these whales. It is, however, impossible to keep such large bones in the Society's rooms; and as there seems to be no prospect of a Natural History Museum in Bombay, it will be a long time before the species of Fin Whales found on this side of India can be satisfactorily determined.

N. B. KINNEAR.

No. V.—AN UNIDENTIFIED ANIMAL IN SOUTH MALABAR.

Can any Member throw any light on the following extract from a paper by Blyth (J. A. S. B. XXVIII, p. 286, 1859)?

"Some time ago, Mr. Baker asserted in a communication to a sporting periodical his belief that a real Mole existed in his neighbourhood. (Footnote.—"Going through the hills, I often come upon a small black velvet-coated creature dead, with the head bitten off. The paws are precisely like those of the English Mole, with a similar tail; the whole a finger's length and about an inch thick. It would be curious to know what kills this animal and whether it be a true Mole, as I think it.")

He now writes:—"I have since had three specimens of the Mole brought to me, but all too far gone for preservation; they were perfectly black with white belly. Moles they certainly were."

It is unfortunate that the skulls were not preserved, or even the entire skeletons in spirit; but I trust ere long to receive examples from Mr. Baker, as a *Talpa* from S. India would be a very unexpected discovery; though, as stated in the sequel, we possess the *T. leucura*, nobis, from the hilly region bordering on the valley of the Sitang river in British Burma, where co-existing with a *Tupaia* and a *Hylomys*. (Footnote.—In a subsequent letter, Mr. Baker remarks: "With the assistance of the hill-people we contrived all kinds of springes, trap-falls, &c., in order to catch the smaller animals; but we could not manage a common Mole-catcher's trap, and I was fairly beaten by a *digger* whose runs reminded me of those of the Mole at home. He seemed to beat us by his *mining*, perhaps, however by the numerous ramifications of his burrow.")

Blyth's correspondent was the Rev. H. Baker, Junr., of Mundakym, Alipi, Southern Malabar.

The 'burrows' in Mr. Baker's second communication were no doubt those of *Gunomys kok*, the common Madras Mole-rat, but the mysterious animal he mentions in such detail is still unknown.

R. C. WROUGHTON.

BRITISH MUSEUM (NATURAL HISTORY),
LONDON, S.W. November, 1914.

No. VI.—THE WHITE-BROWED BUSH ROBIN (*IANTHIA INDICA*)
IN THE N. W. HIMALAYAS—A CORRECTION.

In Volume xxii, page 795 of the Journal, the late Mr. P. T. L. Dodsworth recorded the occurrence of *Ianthia indica* in the N. W. Himalayas and quoted me as confirming his identification. Some time afterwards, Mr. B. B. Osmaston wrote to me asking if I was quite sure of the identification as he himself had once recorded a specimen, which he afterwards discovered to be *Larvivora brunnea*! After some delay I learnt that the specimen was in Mr. A. Jones's collection and he, at my request, forwarded the specimen. On re-examination I find the skin is, as Mr. Osmaston suspected, *Larvivora brunnea*, and I therefore take this opportunity of correcting the record.

Mr. A. Jones has kindly presented the specimen to the Society.

N. B. KINNEAR.

BOMBAY NATURAL HISTORY SOCIETY'S MUSEUM,
1st December 1914.

MISCELLANEOUS NOTES.

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No. VII.—OCCURRENCE OF THE MARTIN (*CHELIDON URBICA*, L.) IN THE PUNJAB.

On the evening of 16th May this year in the midst of a dust-storm at Hissar I observed two birds flying in a northerly direction, which were clearly House Martins (*Chelidon urbica*, L.). About an hour later near the same spot I observed a third Martin following the same line of flight and succeeding in shooting it. The specimen which was a female, fat and moulting, has been compared with English specimens and is an undoubted example of the typical British race.

HUGH WHISTLER, M.B.O.U.,
Indian Police.

SIRSA, HISSAR DISTRICT, PUNJAB,
17th October 1914.

No. VIII.—VULTURES FEEDING AFTER SUNDOWN.

In a recent number of the Society's Journal, a member shooting in the Gir Forest noted that kills had to be covered with branches on moon-light nights (as far as I can remember), otherwise the vultures fed during the night and picked them clean. In regard to the preceding, what happened last night (9th December 1914) may be of interest. My old pony died on the night of 8th December of tetanus, so I decided to let the body be picked clean by vultures and to burn the bones.

The body was put out on an open piece of ground about 250 yards from my tent, and the vultures came in due course.

A little before sunset there were then about 100 birds round the body. I asked the villagers "how soon will the vultures clear off to roost and leave the body," as I wanted to sit up in case a leopard came. Their reply was "the only birds that will go are those that have already filled themselves, the others will remain and go on feeding all night." I pointed out that it was a dark night. Their reply was "that doesn't matter, they won't leave that body until it's picked clean."

So I didn't sit up over the body. At intervals I went outside and heard the screeching of the birds as they fed on the body, and this continued until moon-rise when they were disturbed by a leopard who dragged the body away a short distance.

I personally did not previously know of this habit of the ordinary vulture (griffon?). I saw no red-headed vultures near at sunset. The moon was first day of the last quarter.

O. A. SMITH, MAJOR.

HAZARIBAG, 10th December 1914.

No. IX.—NESTING OF THE HOBBY (*FALCO SUBBUTEO*,
LINNÆUS) NEAR SIMLA, N. W. HIMALAYAS, WITH SOME
GENERAL REMARKS ON THE GENUS *FALCO*
AND ALLIED SPECIES.

As the breeding of this Hobby within Indian limits is of somewhat rare occurrence, I venture to give an account of a nest which I found on August the 16th.

This nest was in a deodar forest, at an elevation of 6,000 feet and within 2 miles of Simla. I may here remark that this, or another pair of

Hobbies. have probably bred in the vicinity in former years, because the friend who accompanied me on my second visit on August the 22nd assured me that two years ago, and in the immediate neighbourhood of this wood, he saw five birds, probably the old birds with their young *perched on trees*. In June this year I had pointed out to him a Hobby when he at once suggested that this was the bird he had seen. I told him it was improbable that they bred this side of the snows, but I think now he was correct in his assertion.

The situation of the nest I found was on three horizontal branches and 40 feet up a deodar (*C. deodara*). It was an oblong in shape, measuring approximately 12" \times 10" by 2 $\frac{1}{2}$ " in depth with a central depression of 2 inches. The nest was composed entirely of fine twigs which did not exceed the diameter of an ordinary pencil.

There were three young in the nest about 16-18 days old. I was attracted by their cries which closely resemble those of the kestrel (*T. alaudarius*). At the same moment I saw one of the old birds leave the nest.

Sitting down I watched their proceedings during a vigil of two hours, and had repeatedly the pleasure of seeing the parents bring food which must have consisted of small insects (chiefly beetles, judging from a pellet disgorged by the young one I took in the hopes of rearing it), though they occasionally indulged in flesh diet (*vide* remarks *infra*). The old birds brought food at intervals of 10 to 15 minutes, their approach being heralded by the hungry cries of their brood. As the parent bird alighted on the nest the young greedily rushed to secure the tit-bit which was always carried in the feet. The duration of these visits lasted but a few seconds. The food being disposed of, a hasty glance round and the parent slipped quietly off, mounting to feed in mid-air 500 feet above the level of the nest. When food was secured the bird dropped with marvellous velocity to the nest. After some time I ordered my climber to go up and bring one of the young ones down and also to lift the remaining two to ascertain if by any chance there was an addled egg. Immediately he extended his hand over the side of the nest, the young Hobbies threw themselves on their backs presenting their claws and open bills, at the same time making as much noise as they were able.

While the intruder was at the nest one of the old birds was perched on the top of a tree, 50 yards away, answering the young but otherwise making no demonstration—behaviour which compares unfavourably with that of a kestrel (*T. alaudarius*), which, while I was taking its eggs, had to be kept off by throwing stones.

On August the 22nd, a friend accompanied me to see how the young Hobbies were progressing. On our arrival one of the old birds was sitting, with its breast towards us, on the side of the nest, remaining there quite 5 minutes. Giving my friend the glasses I asked him to describe the bird as he saw it. He said "it is like a small shahin" (*F. peregrinator*), (a bird well known to him) "with heavy black markings on the underparts."

After the parent had departed, I told the climber to go up when he reported the two remaining young ones dead. These I ordered him to throw down. On examination one proved to be partially eaten; the crop of the other contained portions of a small bird.

Torrents of rains (about 8 inches being registered) had fallen since my last visit, probably to the undoing of the young Hobbies.

The disappearance of the young birds of prey from their nests is not an uncommon occurrence and this instance leaves little doubt, but that the parents, though they may not have killed them, sometimes, at least eat them.

Probably the nursery of these Hobbies had originally been built by crows (*C. macrorhynchus*) and had been altered to suit the requirements of the former, the members of this genus rarely, if ever, building an entirely new nest but simply effecting a few structural alterations.

In the Fauna B. I., Aves, Vol. iii, page 417, Blanford remarks in reference to the nesting economy of the shahin (*F. peregrinator*) "the nest of this falcon, a mass of sticks," &c. This is by no means invariably the case, *vide* the Journal, B. N. H. S., Vol. XXII, No. 3, page 629, wherein the late P. T. L. Dodsworth records the taking of two eggs of this falcon, "the eggs were reposing on the bare ground." Moreover, three eggs of this species which I took this year also rested on the ground. These remarks also apply, I think, to the kestrel (*T. alaudarius*), the merlin (*A. regulus*), the peregrine (*F. peregrinus*) and the luggar (*F. jugger*).

When the eggs of any of the above are found in nests, it will usually be found that the falcon has taken possession of the deserted home of some other species. Whether the red-headed merlin (*A. chicquera*) differs in these habits would appear to be a moot point. Certainly in one instance, at least, I once found the eggs of this species in an old nest, probably that of *Corvus splendens*.

A. E. JONES.

SIMLA, September 16th, 1914.

NO. X.—THE CUCKOO (*CUCULUS CANORUS*) IN THE CENTRAL PROVINCES.

With reference to your footnote in the above article, I could show you a skin of the common Cuckoo shot at Nagpur in June. Cuckoos are regularly heard here in that month, but both the specimens which I shot were males. Comparing these with a male taken on the Darjeeling Himalayas, they are decidedly smaller, the latter exceeding them by about an inch in the total length. The wing measurements are 8.75" and 8.8" as compared to 9" in the hill bird and the undertail coverts of the C. P. specimens are rather irregularly banded with black.

E. A. D'ABREU, F.Z.S.

THE MUSEUM, NAGPUR,
9th March 1914.

NO. XI.—THE RED TURTLE DOVE (*ENOPELIA T. TRANQUEBARICA*).

In reply to the query in Misc. Note, No. XVII, Vol. XXIII, No. I, the following dates may be of interest. The flocks of males in Chanda, C. P., were noted on the 22nd April 1913 and on the 24th March this year. I saw a male in Dera Ismail Khan where they are rare.

I found this dove fairly well distributed throughout the Chanda District, where it was breeding during April—a nest C/2 with fresh eggs was taken on 8th April 1913 and a pair were observed building on the 19th of that month.

TANK, N. W. F. P.,
15th September 1914.

C. R. S. PITMAN,
27th Punjabis.

NO. XII.—THE LESSER FLORICAN (*SYMPHEOTIS AURITA*, LATH.) IN THE PUNJAB.

The Lesser Florican is so seldom met with beyond Delhi in Upper India that the following records may be of interest. On 21st July last my

attention was attracted by an unknown black and white bird which was standing and occasionally jumping into the air, in a grass field on the Government Cattle Farm at Hissar. It was shot and proved to be a male. The stomach contained grasshoppers. Other specimens were seen in the grass lands of the Cattle Farm Bir by Mr. Blanford, I.C.V.S., as follows:—8th August, one, probably a male; 23rd August, a male; 6th September, male and female found separately. One of these latter specimens is believed to have been seen again on 24th September.

HUGH WHISTLER, M.B.O.U.,
Indian Police.

SIRSA, HISSAR DIST., PUNJAB,
17th October 1914.

No. XIII.—HABITS OF THE KALIJ PHEASANT.

It may be of interest to note that on 30th ultimo I came across a cock Kalij Pheasant (*G. horsfieldi*) looking after a flock of young a few days old. I saw no sign of the hen, though I watched the cock for several minutes. Probably she was absent looking for food. The cock was very aggressive and ran around demonstrating, often coming within 10 yards of me. The chicks were hiding in the leaves, one within a few inches of my feet.

H. W. A. WATSON.

MOGOK, BURMA, 6th April 1914.

No. XIV.—EGRET FARMING IN SIND.

With reference to Mr. Birch's interesting article on this subject I should like to mention one or two points which appear to require further elucidation. I have heard a good deal about Egret farming lately, and though never having seen an Egret farm myself I have interested myself in the subject and have endeavoured to gain as much information as possible regarding the methods followed in collecting Egret plumes.

As a rule the so-called Egret farms are situated in localities difficult to access in the hot weather, and so far I have never met a European official who has seen one except in the cold weather.

All officials, however, whom I have questioned on the subject, have told me that the birds they have seen are kept for breeding purposes, but the only evidence they had to support their statement was that the owners of the farms had told them so.

On several occasions I have observed natives catching Egrets by means of decoy birds that had their eyes sewn up by means of a feather passed through the eyelids. These birds were placed in a spot frequented by Egrets and not being able to see, remained where they were put down. The ground round about being strewn with loops any birds that alighted near them stood a very good chance of being entangled. On one occasion last year also I saw some 50 or 60 birds being despatched by rail, every one of which bore evidence of having had their eyes sewn up, some were quite blind with their eyelids so swollen that they could not open them, while in others, though they could open their eyes, one could distinctly see where the eyelids had been pierced. I questioned the man in charge of them, and at first he told me that the birds were for breeding purposes and that he plucked their feathers every year and sold them to a "Sahib" at Rs. 18 per tola, but eventually he allowed that they were decoy birds being

sent to a "Sahib" on the Sutlej. Before, however, I could find out any more, his "better-half" turned up and slanged him roundly for giving the show away. Now my ideas on the subject are that the feather traders, knowing it to be illegal to destroy Egrets for their feathers, keep these decoy birds in more or less humane surroundings during the cold weather when they are likely to be visited by European officials and have invented the story regarding their breeding in captivity, and all the evidence I have obtained on the subject goes to prove my theory.

Mr. Birch states in his article that there was "ample evidence to indicate that the birds breed freely" but he does not state the nature of his evidence. Did he himself see the old birds sitting on eggs or young and were the photographs reproduced taken by himself? It seems extraordinary that the birds should assume breeding plumage four times a year, when I believe many birds do not assume breeding plumage at all in unnatural surroundings. In a natural state Egrets commence breeding at the very earliest in June, and the majority not till July, did Mr. Birch himself see them breeding in March or was he only told so?

Again Mr. Birch does not state at what time of the year he visited the farms, it would be most interesting to know this. As if he himself saw the birds breeding in March and took the photos himself his statements require no further confirmation, but if he did not see the bird sitting himself and did not himself take the photographs I am afraid without further confirmation his article is of little use from a scientific point of view.

It would be a dangerous undertaking to legitimize the feather trade at present, as even though Egret farming could be carried out on the lines stated by Mr. Birch in Sind, there are still a large number of birds slaughtered for their plumes all along the Indus, Chenab and Sutlej rivers and should the trade be legalized those who collect the feathers by slaughtering the birds would take full advantage of the law, and it would be next to impossible to convict them of obtaining their feathers in an illegal manner. Other species of birds also would suffer by the removal of the restriction, as it would be quite impossible to breed several of the species whose plumes are sought after profitably in confinement; and even should it be possible to breed all birds in captivity for the sake of their plumage, why should the vanities of the female sex be pandered to at the expense of the wretched bird whose lot in confinement, even under the most favourable circumstances, is wretched as compared with that of his kind at large.

The above remarks are not intended to cast any reflections on Mr. Birch's article, but I do consider that, in order to remove all doubt on the subject Mr. Birch should state whether he actually saw the birds incubating eggs himself and whether he himself took the photographs, as it would be a very simple matter to place young wild birds in the aviaries during his visit there.

J. LINDSAY SMITH, MAJOR, M.B.O.U., I.S.

QUETTA, 3rd August 1914.

[On showing the above note to Mr. Birch he replied as follows:—"The photographs printed in the Journal were all taken on *surprise visits* to different farms. Plate A. at a place 7 miles from Rohri on the bank of the Western Nara; Plate B at a village 6 miles from the town of Larkana; Plate C. at Rahuja on the Sukkur Canal, a place 3 miles from Sukkur. The first two photos were snapshots taken by myself. I had to secure the help of a professional photographer to take Plate C., as my Kodak was not large enough to get an interior view; but I visited this farm myself also. The other photos sent to you which were not published were taken by me personally."—Eds.]

No. XV.—COTTON TEAL (*NETTOPUS COROMANDELLANUS*)
IN KASHMIR.

You may be interested to learn of the occurrence of the cotton teal in a region so far removed from his usual habitat as this is. On Monday on the great Holdra jheel, about 6 miles from here in the first shoot of the season, I killed what appears to be a young male, though the dark ring below the neck is absent. I showed it to Col. Ward who had no note of a former occurrence in his "Birds of Kashmir." He is having it skinned and if you wish it I will send you the skin. Curiously enough the boatman who was out with me seemed to know the bird which he called a "Noora," but he had never seen it before in the shooting season. The bags per gun made on Monday varied from 60 to 168 (7 guns) chiefly teal and whiteeyes, but there were some mallard and a few gadwall, also a Wigeon. Some pintails and a gaggle or two of geese were seen.

F. J. MITCHELL.

SRINAGAR, 14th October 1914.

No. XVI.—MALLARD BREEDING IN THE KARACHI ZOO.

A pair of Mallard caught at Pithoro, Sind, in February 1914, produced 6 ducklings towards the end of June in the Zoological Gardens, Karachi, to the surprise of a good many people in the locality. Two out of the six have since died, but the remainder (3 ♀ ♀, 1 ♂) are still flourishing and have at the time of writing assumed their full plumage. There are no signs whatsoever of any cross having taken place. The parent birds escaped from the Duck Pond and constructed their nest in a dense bamboo thicket on an island in the middle of the Large Pond reserved for Storks, Geese and Pelicans. The nest was not discovered until after the hatching had taken place.

I am not aware that the Mallard, *Anas boscas*, has been known to breed (even in captivity) in the plains of India before, hence I thought a short note on the occurrence might be of interest.

F. LUDLOW.

KARACHI, 28th September 1914.

No. XVII.—MARBLED TEAL ON THE N. W. FRONTIER.

I think it may be of interest to you to know that I shot a ♀ Marbled Teal (*M. angustirostris*) this afternoon, about 9 miles west of the Cantonment on a small jheel near the Kabul river. I have never heard of or seen this duck in these parts before, I do not know whether it has been often recorded from N. W. Frontier?

NOWSHERA, N. W. F. P.,
11th October 1914.W. M. LOGAN HOME, CAPT.,
12th Infantry.

No. XVIII.—NEW GAME BIRDS FROM THE N.-E. FRONTIER.

In the last Number of the Bulletin British Ornithologists Union, Vol. XXXV, p. 18, Mr. E. C. Stuart Baker described a new Blood pheasant as *Ithagene tibetanus*. This species differs from the lately described *kuseri* in being much paler below and the crimson being confined to the breast. The lores are crimson instead of black and the supercilium instead of

being black and crimson is pure crimson. The black gorget is much restricted compared with that of *kuseri*. The other species described is *Tragopan blythi molesworthi*, which differs from the typical *blythi* in being much darker above, the red on the breast being more confined and the whole underside much paler. Both these specimens were collected by Capt. Molesworth on the borders of Tibet and the N.-E. frontier and presented to the Society.

No. XIX.—OCCURRENCE OF NAIA BUNGARUS (SCHLEG) IN THE PUNJAB.

According to Dr. J. Ewart in the "Poisonous Snakes of India" (1878), the king cobra therein described as *Ophiophagus elaps* has three varieties which he says are distributed as follows: "The first variety (the olive-green one) is found in Bengal, Assam, the Malayan Peninsula and Southern India (Fayrer); the second (brownish-olive) in Bengal (Fayrer) in the Philippine Islands and perhaps in Burma (Gunther); and the third (uniform brownish-black) is found in Borneo (Fayrer). W. Theobald in the "Descriptive Catalogue of the Reptiles of British India" (1876), describes it as *Naja elaps* and says "that it inhabits India, Burmah and the Tenasserim Provinces." Dr. Boulenger in the "Fauna of British India, Reptilia and Batrachia" (1890), says that it inhabits "Southern India, Orissa, Bengal, Assam, Burma, the Andamans, Siam, the Malay Peninsula, Java, Borneo, Sumatra and Philippines." While Major Wall in "The Poisonous Terrestrial Snakes of our British Indian Dominions" (1913), gives the distribution as "it is found throughout our Indian dominions (with the exception of Ceylon and I believe Western Rajputana, Sind, and the Punjab (?); in suitable localities, that is in jungles or their vicinity. It occurs in hilly regions up to an altitude of 7,000 feet and in the plains in their vicinity." The query mark after Punjab indicates that Major Wall is rather doubtful as to the occurrence of the hamadryad or king-cobra in the Punjab. Recently, however, I obtained a specimen from the forest on the banks of the River Ravi near Lahore. Also there is a specimen in the museum of the Government College, though no locality is given as to where the specimen was taken. The form thus apparently occurs in the Punjab.

BAINI PARSHAD, B. sc.,
Alfred Patiala Research Student.

ZOOLOGICAL LABORATORY, GOVERNMENT
COLLEGE, LAHORE, 8th October 1914.

No. XX.—A NEW *PENTHEMA* FROM BURMA. (With a plate.)

Among other butterflies caught by me in the Tharrawaddy District of Lower Burma is a *PentHEMA*, allied to *darlisa* M., but unlike any form hitherto described. The differences between it and *darlisa* seem greater than those between *darlisa* and *lisarda*, Db., and if these forms represent two distinct species the new one should represent a third. I propose to call this new form *yoma*.

PentHEMA yoma nov. sp.

Description.—Upperside of forewing differs from *darlisa* chiefly in that the straw coloured streak in interspace 1a is absent, or only just indicated at the posterior angle. Further, the spot in interspace 4, of the post discal series is considerably out of line with the rest. This character is

present in *darlisa*, but is not so marked in *lisarda*, the two series are almost parallel. For the rest, the spots are in the same positions, and are of the same colour and size as those of *darlisa*. The black ground colour is similarly glossed with blue.

Hindwing.—Basal area uniform black, there being sometimes just a dusting of straw-coloured scales in the apex of the cell. The straw-coloured internervular of the discal series streaks are broad and clavate, herein differing from both *darlisa* and *lisarda*. They might almost be said to form a band traversed by the black veins. These streaks are followed by a sub-terminal series of spots, more or less hastate in shape and as broad as the interspaces; the postdiscal series, common to all forms of *darlisa* and *lisarda* is absent, the discal streaks extending to the position these spots should occupy. All these markings are pale straw-coloured, as in *darlisa*.

Underside.—Ground colour as in *darlisa*, that is apex of forewing and all the hindwing rufous brown, the basal area of the forewing darker, not rufous. Streaks and spots as on the upperside. Antennæ, head, thorax and abdomen as in *darlisa*.

Expanse.—110-125 mm.

Habitat.—Pegu, Yoma, Tharrawaddy District in Lower Burma. Described from two specimens from the above locality, caught in April 1909 and May 1912, in heavy jungle. Elevation 200 to 1,500 feet. One was taken feeding on the skull of a recently killed serow.

The type specimen, which I take to be a male, has been deposited in the British Museum.

These two specimens were the only *Penthemas* I got in four years' collecting in Tharrawaddy. It does not seem as if either *darlisa* or *lisarda* flew with it. On the other hand a single *Penthema* I have from the Arakan, Yoma, Henzada District, to the west is *lisarda* while on the east, at Pathichauing in the Toungoo District at the foot of the Karan Hills, *darlisa* occurs. It therefore seems likely that the present form is peculiar to the forests of the Pegu Yoma, which forests are isolated from those to east and west by big rivers (Sittang and Irrawaddy) and their plains.

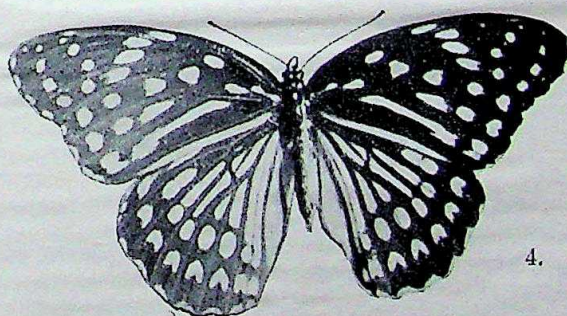
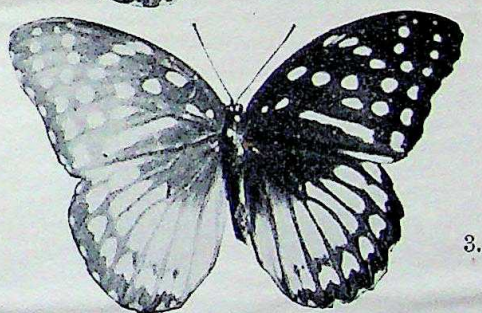
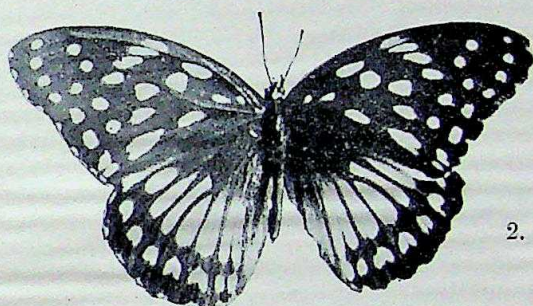
As to whether the form now described should be regarded merely as a race of *darlisa*, it can be understood that a form represents a race of another when its markings are those of that other, either partly absent or reduced or increased in size [e.g. *binghami* race of *darlisa*]. But in the present case while the basal markings are entirely gone from the hindwing, this being apparently a change in the direction of *darlisa*, the discal markings are even more prominent than in *lisarda*, while there is no sign at all of the postdiscal series of spots, common to both those forms, not even of their being joined to the discal streaks.

DeNicéville (Vol. ii, page 144), Bingham (Vol. i, page 390), and Evans, (Journal B. N. H. S., Vol. xxi, page 580), all show three species of *Penthema*; *lisarda*, *darlisa*, and *binghami*. Seitz, at page 463 of Vol. iv, gives two species from India, sinking *binghami* as a race of *darlisa*. He also raises *mihintala* as a new race of *lisarda* from the Chin Hills of Upper Burma and gives two other races of *darlisa*, but all the forms he describes have the markings constant throughout, though reducing in size, and none resemble the present form in the least.

In the accompanying plate the upper figure is *P. lisarda* from the Teesta, the two central figures are *P. yoma* and the lower is *P. darlisa* from the North Shan States. The last named does not quite agree with Bingham's figure, and may not be typical.

E. V. ELLIS, I.F.S.

LYME REGIS, ENGLAND, 7th October 1914.



1. *Penthema lisarda*, Db. 2 & 3. *Penthema yoma*, nov. sp.
4. *Penthema darlisa*, M.

No. XXI.—A NOTE ON *ARGYNNIS CASTETSI*.

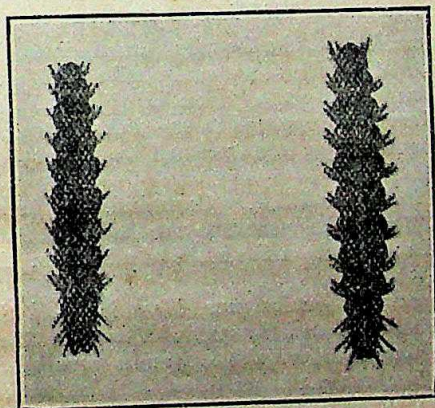
Argynnis castetsi, Oberthür, which occur only in the Palni Hills in South India, is usually considered to be a well differentiated race of the widely distributed *Argynnis hyperbius*, Johanssen. It differs from the type form mainly in that the female, as regards colour and markings, resembles somewhat the female of such a species as *Argynnis aglaia* and in consequence the striking sexual dimorphism exhibited by *hyperbius* is wanting.

In April 1912, owing to the kindness of Mr. Y. Evershed of Kodaikanal, who forwarded ova of *castetsi* to Ceylon, I was given the opportunity of comparing the larvæ of the two races, and somewhat to my surprise found that they could be easily separated. A brief description of a full grown larvæ of *A. hyperbius* from Ceylon is as follows:—

Head.—Black; oval in shape with a pronounced frontal furrow or depression; on each side of the furrow on the vertex of the head is a conical prominence bearing a stout spine hair; number of small black hairs are scattered over the whole surface.

Thoracic and abdominal regions.—The ground colour of the body is velvety black with the exception of a broad dorsal stripe which is fulvous red. On each side of the thoracic segments is a pair of black spiny processes, one process being situated to the side of the dorsal line and the other supra-spiracular in position. On the abdominal segments there are two pairs of spiny processes situated as on the thoracic segments and also a third pair, each process being sub-spiracular in position. These abdominal processes are red or fulvous red tipped with black.

The legs are black but the "suckers" of the prolegs are red as also are the anal valves. [The length of this specimen was 38 mm.]

*A. hyperbius*.*A. castetsi*.

The larvæ of *A. castetsi* resembles that of *hyperbius* in general structure but differs constantly in the following particulars:—

- (1) the red dorsal stripe is entirely absent;
- (2) the processes on the abdominal segments are pink;
- (3) the form is somewhat more slender.

The most reliable character is the presence or absence of the dorsal stripe which appears at a very early age, at once distinguishing *hyperbius* from the allied form.

I have been unable to discover many descriptions of the larvæ of *A. hyperbius* from India but it appears that the forms from the more northern regions of the country always possess the red dorsal stripe. The imagines of *hyperbius* from the Nilgiris are to some extent intermediate between the type and *castetsi* but the larvæ is not apparently described. Until this has been done it is perhaps unwise to venture any remarks on the possibility of *A. castetsi* being a good species. Taking into account however the marked features of both imago and larvæ it would appear, that a *A. castetsi* has a better right to be considered a fine species than many other geographical races, and on the whole it seems that the burden of proof should rest with those who would consider it only a form of *hyperbius*. It is, however, very desirable that the larvæ of the Nilgiri form should be described since the Indian races of this Argynnid seem to be on the border line between distinct species and mere local forms, and as such likely to assist in the solution of several perplexing problems.

An attempt was made in Ceylon to interbreed the two forms but it was unsuccessful mainly I believe owing to the experiment being carried out in too hot a climate. This experiment is well worth repeating if the opportunity occurs, as the results from a fertile pairing would be of the greatest interest. In this connection it may be mentioned that the ova and larvæ of *A. hyperbius* are not hard to find on the food-plant *Viola patrinis* D. C. if the small and sickly-looking plants are searched. In Ceylon healthy and vigorous plants were seldom productive, an observation also made by Mr. Evershed in India.

T. C. F. FRYER, M.A., F.E.S.

LONDON, October 1914.

No. XXII.—THE BEDA WEED (NILE LILY) *EICHHORNIA SPECIOSA*, SOLMS.

Mr. R. Grant Brown, I.C.S., the Deputy Commissioner, Bassein, Burma, wrote in September 1913, asking if we could give him any information of the best method of suppressing the "Nile Lily" which, he said, was the name of a plant which had appeared in the delta in the last few years and was blocking up the waterways, and enclosed copies of correspondence on the subject.

Mr. M. Laurie, M.V.O., I.C.S., Commissioner, Irrawaddy Division, enquired in July 1913 what happened to the Beda weed during the months of heavy rainfall and to report on the state of affairs on the 1st September 1913.

In reply, the Deputy Commissioner, Bassein, said that from reports received from Sub-Divisional and Township Officers of the Kyonpaw Sub-Division it appeared that the navigable channels were all free of the weed on the 1st of September, though a good deal of it remained in backwaters and along the edges of streams, where it was entangled in bushes. The Sub-Divisional Officer, Bassein, has not yet reported, though a reminder was sent to him on the 8th of August and others since.

Beyond setting free the weeds which have become entangled in bushes and allowing them to be carried away by the current, I do not at present know of any measures which are likely to be useful in preventing a recurrence of the nuisance next year. In this district no unpaid labour has been exacted from the villagers and no attempts have been made to construct booms, though I should have been inclined to experiment with these had it not been for the fact that the experiment has, I understand, been tried in other districts. It seems probable that the conditions in

districts where booms have been made and a large amount of labour exacted from the villagers are now the same as they are here; that is, such labour would in this district (though not perhaps in others) have been useless so far as the future is concerned, while I do not think it likely that it would have assisted navigation in anyway at the time it was undertaken. What seems most needed now is to ascertain (a) the habits of the plant, and (b) the successful measures, if any, taken for its suppression in other countries.

As to (a) I have been able so far to get no information locally. I have asked the Director of Agriculture whether he can help me. It has been the practice in some parts to take the weed up on shore, but there is at present nothing to show that this will prevent its propagating itself in the river at the beginning of next rains, and it may even do harm.

As to (b) I have received information from various sources that large sums have been spent in combating the weed in North Australia, America, and other countries; and as to this also I have asked the Director of Agriculture whether he can obtain any information for me. Until such information is obtained, or the success of the experiment already undertaken in the delta established, it seems highly undesirable that any money should be spent in combating the weed or that villagers should be forced to undertake labour which may be useless.

The Deputy Commissioner, Bassein, in September 1913 enquired from the Director of Agriculture, Burma, as to the habits of the Beda weed (said to be called the "Nile Lily"), which is now blocking the waterways of the delta. I have made some enquiries regarding the seeds and the manner in which it is propagated, but have so far failed to elicit anything of value. In some parts of the delta it has been the practice to induce the villagers to drag it up on to the bank. It seems quite possible that this work may be useless and may even aggravate the evil.

I am informed that large sums have been spent in combating the weed in North Australia, America, and other countries. If this is the case, it is highly probable either that some effective way of keeping down the weed has been discovered which could be used in Burma, or that all measures tried have proved to be useless. Information as to the methods used would be very valuable; in the latter, it would probably be useless to go on spending money for the labour of villagers in attempting to suppress the nuisance. In this district all attempts to suppress it have been abandoned for some months, and the waterways are now clear, the weed having been carried away by the current.

The weed is not mentioned in the *Dictionary of Economic Products*, which includes a number of pests.

Mr. A. M. Sawyer, Assistant Botanist, forwarded the following note on this weed:—

"This is the *Eichhornia speciosa*, Solms, the most persistent and troublesome of tropical weeds. It propagates itself by means of seeds and suckers both of which are light and driven by the wind. It is already a terrible curse in Florida, Java and Australia. In Ceylon a special law—the "Water Hyacinth Ordinance"—was passed in 1909 against its importation and cultivation. Last year, at the request of the Executive Engineer, Pegu, I was deputed to inspect the Pegu Canal and the *In* near the village of Thanat-pin which were then full of the weed. The conclusion arrived at by us was that the most efficient, though expensive, method of dealing with it would be to cut it into sections and drag these out by suitable steam-tugs into the strong current of the river or even into the sea itself as is now regularly done with the "Sud" in Egypt, Florida and elsewhere. As the plant flourishes chiefly in *stagnant fresh-water*, this method is the only one con-

sistent with efficiency and therefore economy, that can be suggested for trial in places where the weed is already thick enough to be cut and dragged out in fairly large masses. In places where it is not clumped together, it may be collected and either dragged into the current of streams to be carried out to sea or thrown on to bamboo rafts or into boats to be subsequently heaped upon the shores of the waters it infests and there *completely burnt*, when dry enough, if necessary, with the aid of an inflammable material like *Ye-nan* or *Crude Kerosine Oil*. As the plant easily takes root and grows well on moist earth, burning it is one of the safest means of destroying it. Thus dragging out to sea and burning are the only two efficient methods of dealing with the weed ; and either is now practised wherever it prevails.

The weed is spreading rapidly in the country ; and it is high time now that prompt and systematic measures and co-operation were enlisted in attempts to its extermination, even, if need be, aided by the law."

EDITORS.

PROCEEDINGS

OF THE MEETING HELD ON 13TH OCTOBER 1914.

An "At Home" of members and their friends of the Bombay Natural History Society took place in the Society's Rooms on the 13th October 1914.

The election of the following 29 members since the last meeting was announced:—Mr. V. H. T. Fields-Clarke, I. F. S., Kindat, Burma; Mr. A. S. V. Acott, I.C.S., Sukkur; Capt. C. Harvey-Kelly, Karachi; Capt. A. Marshall, Quetta; Sahebzada Sardar Mahmed Khan, Larkana; Mr. J. C. Curry, Sukkur; Mr. A. C. Robinson, Sukkur; Mess Secretary, 13th Rajputs, Agra; Mr. E. Eisenhofer, Lampong, North Siam; Lt.-Col. C. Stuart Prince, I. A., Lucknow; Mr. C. J. Hall, Travancore; Dr. Wm. Mowat, Peermade, S.I.; Mr. L. Price, Travancore; Mr. H. L. Cruttwell, Cuttack, Orissa; Mr. W. H. A. Webster, Kyankse, U. Burma; Mr. H. G. Stokes, C.I.E., I.C.S., Madras; Maharana Shri Jorawarsinhji Partapsinhji, Raja of Sunth, P. O. Sunth-Rampur, Rewa Kantha; Maharaj Kumar Shri Vijay-sinhji of Rajpipla, Nandod, *via* Ankleshwar; Mr. Chas. J. Hodgkins, Dera Ghazi Khan; Mr. Bainsi Parshad, B. Sc., Lahore; Mr. H. G. Gruer, I.C.S., Chanda, C. P.; Mr. N. Padmanabha Panikkar, Trivandrum; Mr. J. B. Norman, Champaran; The Registrar, University of Punjab, Lahore; Mr. F. E. Sharp, Rajkot; Mrs. Reddoch, Rangoon; Capt. E. G. Colvin, The Residency, Indore; Mr. E. H. N. Lowther, Calcutta; and Mr. A. H. Marshall, Rohtak, Punjab.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting:—

Contribution.	Locality.	Donor.
2 Takin Skins and Skulls (<i>Budorcas taxicolor</i>), 2 Golden Cats (<i>Felis temmincki</i>), 1 Panda (<i>Ailurus fulgens</i>), 2 Flying Squirrels (<i>Petaurista</i> sp.) 1 Bamboo Rat (<i>Rhizomys</i> sp.)	Burmo-Chinese Frontier.	Mr. Lowis.
1 Himalayan Serow (<i>Capricornis</i>), 1 Goral (<i>Nemorhedus goral</i>), 1 Mouse Hare (<i>Ochotona roylei</i>).	Kumaon ..	Col. H. C. Tytler.
1 Desert Foxes (<i>Vulpes leucopus</i>), 1 Jungle Cat (<i>Felis affinis</i>), 1 Jackal (<i>Canis indicus</i>).	Hissar, Punjab ..	Mr. C. E. Branford.
1 Langur (<i>Presbytis phayrei</i>) ..	Burma	Mr. F. C. Purkis.
1 Slender Loris (alive) (<i>Loris lydekkerianus</i>).	Bombay docks ..	Mrs. Watson.
3 Hedge hogs (alive) (<i>Erinaceus micropus</i>).	Ahmedabad ..	Mr. R. H. Heath.
2 Do. do. ..	Baroda	Mr. W. E. Jardine.

Contribution.	Locality.	Donor.
3 Sclater's Monals (<i>Lophopohrus sclateri</i>), 5 Silver Pheasants (<i>Gennæus</i> sp.), 3 Blood Pheasants (<i>Ithagene kuseri</i>), 1 Temminck's Tragopan (<i>Tragopan temmincki</i>), 1 Bamboo Partridge (<i>Arbicola rufogularis</i>), 1 Imperial Pigeon (<i>Carpophaga insignis griseicapilla</i> .)	Burmo-Chinese Frontier.	Mr. Lowis.
Several Bird Skins	Nilambur	Mr. A. P. Kinloch.
9 Bird skins and 1 Snake	Fyzabad	Mr. F. Field.
1 Fledgeling Hobby.	Simla	Mr. A. E. Jones.
1 Swift (<i>Chatura indica</i>)	Mt. Abu	Mr. T. R. Livesy.
1 Night Heron (<i>Nycticorax nycticorax</i> .)	Bombay	Mr. Counsell.
2 Checkered Water Snakes, 2 Kraits, 2 Green Pit Vipers.	Andamans	Mr. F. Wall.
Krait and 1 Tree Snake	Shwebo	Mr. W. Walsh.
3 Snakes, 4 Rock Lizards, 3 Skinks.	Chilas	Capt. C. T. Daukes.
2 Snakes	Hissar	Mr. C. E. Branford.
6 Snakes, 2 Frogs and 1 Skink.	Bangkok, Siam	Dr. Malcolm Smith.
4 Lizards and several Insects.	Nasik	Mr. N. B. Kinnear.
Moths and Butterflies	Ladak	Major Kirby.

Minor contributions from Mr. C. H. Dracott, Capt. Sheppard, Mr. Rigby, Mr. C. Fisher, Mr. S. H. Prater, Capt. A. Wilson, Capt. Gharpurey, Major Browne, Mr. Gordon-Ralph and Dr. Bayley de Castro.

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